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**May 1:** America's preeminence in planetary exploration is in deep trouble, according to NASA scientists attending Thursday's session of the 18th Annual Space Congress at Cocoa Beach.

In fact, after the ravages of the recent budgetary process, only one probe into deep space is scheduled over the next decade, and that mission is tentative.

Voyager I's successful close encounter with Jupiter and Saturn was followed by an almost flawless launch of the Space Shuttle last month. So it is hard for Americans to imagine that we will be anything but number one in space for some years to come.

"But even as we're sitting here at this moment basking in the renaissance of America's manned space program...there's a chill wind blowing through our planetary program," said Torrence Johnson, NASA's lead scientist for the Galileo project.

The Galileo project will send both an orbiter and a probe to Jupiter. The orbiter will fly by Jupiter 20 to 100 times closer than Voyager did. The probe will descend through Jupiter's atmosphere, sending information back to Earth, until it comes so close to the surface of the planet that temperatures and pressure destroy it.

But the Galileo project, originally planned for 1982, has been repeatedly delayed because of problems with its launch vehicle -- the Shuttle. And because of those delays, the position of the planets has changed, and the rocket originally designed to boost the probe and orbiter from the Shuttle's payload bay into deep space is no longer powerful enough.

An alternate and more powerful Centaur booster and an attendant increase in cost must now be approved by Congress. (TODAY, 5-1-81, p. 16A)

<> Thomas J. O'Malley, Rockwell International's vice president and general manager of launch operations at Kennedy Space Center, has been named man of the year by the Canaveral Council of Technical Societies.

The Society, which sponsors the Space Congress, honored O'Malley "for his leadership in building and testing this nations's -- and the world's -- first reusable space vehicle."

O'Malley, who has been with Rockwell since 1967, first worked for the Curtis Wright Co. He was test conductor on the Atlas ICBM program in the late 1950s and was in charge of the Mercury flight that sent John Glenn into Earth orbit.

The Society also announced the chairman for its next Space Congress: George R. Faenza, the director of McDonnell Douglas's Kennedy Space Division. (TODAY, 5-1-81)

**May 2:** The space shuttle Columbia may be assigned to rendezvous with a crippled sun-gazing satellite in orbit as early as next spring to replace a faulty electronic unit in the $77 million solar observatory.

The extraordinary space repair mission is under serious consideration by space agency engineers and received a boost from the highly successful maiden test flight of the shuttle earlier this month.

A senior National Aeronautics and Space Administration official will be briefed on the idea next week and a formal proposal is expected to be made to NASA's managers by June.

Donald Turner, a payload integration manager in the shuttle operations office, said it would be technically possible to send the Columbia up to fix the satellite next spring. But he said there are a number of complications, including the fact that a package of test flight data instruments would have to be dropped from the mission.

The satellite also is expected to be just barely within reach of the shuttle. The satellite now is in an orbit 333

miles high, and is expected to have dropped to around 327 miles next spring. That's the maximum altitude the Columbia will be able to achieve by that time.

The repair would not require spacewalking by the two-man shuttle crew. The idea is to use the shuttle's 50-foot-long manipulator arm to grab the observatory and place it on a platform in the shuttle's cargo bay.

The arm, directed by astronauts watching the action on television, then would turn two bolts to remove the faulty control system unit or module. A new module would be inserted into the satellite and the spacecraft would be released to resume normal operation.

Turner said astronauts have practiced such an operation at the Johnson Space Center in Houston and feel confident the job could be done.

The arm will be installed in the Columbia in the next few months to be tested for the first time in space on the shuttle's second flight, now expected in late September or October. (SENTINEL STAR, 5-2-81, p. 5-B)

**May 4:** The House Subcommittee on Space Science & Applications has called on the Reagan Administration to commit the United States to a major new space project, citing the construction of manned, multi-purpose orbiting Space Base as one good candidate for such an undertaking.

"Commitment to a major, high-challenge space engineering initiative is both technically feasible and desirable," the subcommittee said, and the Administration should commit this country to such an initiative.

The recommendations by the House subcommittee, which is chaired by Democrat Ronnie G. Flippo (Ala.), is in line with that made by the chairman of its counterpart in the Senate, Republican Jack Schmitt (N.M.), who has called for a new start on a Space Station in 1984. The recommendations also have the backing of Rep. Don Fuqua (D-Fla.), chairman of the subcommittee's parent Science & Technology Committee.

In a 41-page report on "United States Civil Space Policy" released last week, the House subcommittee also recommended that NASA submit a set of long term goals for the space program, which reflect "a balance" between space science, applications and space transportation. (DEFENSE DAILY, 5-4-81, p. 11, Vol. 116, No. 2)

<> Up to eight RCA-built satellites may be launched this year, including three Defense Department spacecraft. The first two "Nova" military navigation satellites, follow-ons to the Navy's Transist system, are slated for launch this year, along with the DOD's Block 5D-2 Defense Meteorological Satellite Program (DMSP) spacecraft. Nova, unlike Transit, has an orbit adjust system and a capability to store astronomical data for eight days. The Block 5D-2, planned for launch late this year, employs extra sensors and has a longer service life than its predecessors. The other RCA satellites planned for launch this year are two NASA Dynamic Explorers (single Delta launch), two RCA Satcoms, and the NOAA-C weather satellite. (DEFENSE DAILY, 5-4-81, p. 15, Vol. 116, No. 2)

<> They all laughed at Christopher Columbus, too -- so retired Navy Capt. Robert Truax, 63, is sticking to his dream of launching the first privately sponsored spaceship. Last summer he conducted a successful 60-second ground test of his homemade "Volksrocket" -- built of parts salvaged from the aerospace industry's junkyards -- with an eye toward a fifteen-minute manned flight into space and back this fall. Now money troubles may turn his vision into mission impossible.

"We ran out of money last September," says the engin r who once worked on the Navy's Polaris missile program. Truax sank his entire savings of $60,000 into the project and then looked for backers. He thought his worries were over when a Chicago real estate broker and 38 investors raised $250,000, but the group pulled out. Truax says he has been approached by venture capitalists in Phoenix and Dallas and hopes to raise $1 million more. His staff, meanwhile, has dwindled to five volunteers.

Still up in the air: who will man the rocket if it is ever launched? Truax is thinking of asking his old pal, ex-astronaut Jim Lovell, to help screen the 4,000

applicants, who range from a psychologist to a jockey. One of the most promising candidates is a female Braniff pilot who has logged 3,000 hours of flying time.

There were technical kinks to iron out, too. For example, propellants have been pumped into the combustion chamber too quickly, causing flames to shoot out in all directions when the rocket is ignited. Truax figures he needs four Volksrockets on hand to conduct unmanned tests. The rocket is meant to be reusable: it will parachute to earth and be recovered from the sea.

Truax is negotiating with Miami city officials in hopes of launching the manned rocket from the Florida coast. But even if he manages to raise the money he needs it will take at least another year to get ready for that flight. Meanwhile, in his driveway in Saratoga, Calif., sits the 25-foot-long rocket "Private Enterprise." "Whenever I get too frustrated," he says, "I just grab my monkey wrench and hammer and build a little more." (NEWSWEEK, 5-4-81)

**May 5:** By the standards of 20 years ago it was a technological wonder. Today it would hardly rate more than perfunctory media coverage.

The day was May 5, 1961. Alan Shepard sat atop a Redstone rocket in a cramped Mercury capsule -- known as Freedom 7 -- and was catapulted into space.

The 15-minute, 22-second ride earned him a place in history as the first American to be launched on a suborbital flight.

The historic moment blazed a trail toward other space accomplishments. And the memory of that first manned mission, while lost in today's advanced technology, still lingers at Kennedy Space Center.

"We all had butterflies in our stomachs," said Isom Rigell, NASA deputy director of cargo operations.

Rigell, who was acting chief of electrical systems 20 years ago, took time out Monday to recall launch day as he walked about Freedom 7's now silent operations room at Cape

behind them ready to respond to any problem," he said.

A problem occurred at one panel, delaying the countdown for 52 minutes.

Rigell said he recalled Shepard barking into the microphone, "I'm cooler than you are. Why don't you fix your little problem and light this candle."

Rigell said he and others hurried to replace an inverter in the rocket's electrical system.

"The device had to work right," he said laughing at Shepard's impatience.

Shepard encountered another delay when a computer error was detected.

After a total hold time of two hours and 34 minutes, the count continued and progressed without trouble.

During blastoff, Rigell and the rest of the crew cheered the Mercury rocket.

"You could just feel the rocket take off," he said. The pad was located only several hundred feet away from the operations building.

Looking out toward a short window facing the launch pad, Rigell said, "Once the rocket lifted off, we couldn't see it." Information was fed to the crew by a tracking station.

"When we knew the rocket was right on course, we had the job done," he said.

Shepard successfully splashed into the Atlantic Ocean a little more than 300 miles from Cape Canaveral.

"We were pleased because it helped the country," Rigell said. "We were really catching up with the Russians."

The Soviet Union successfully completed a manned orbital mission 23 days earlier.

Regarding the progress of the past 20 years, Rigell said, "Back then we didn't envision how fast we would travel in space."

"(President) Kennedy came along and was telling us we're going to the moon."

While the first manned flight was pretty exciting, Rigell feels bigger and better things are to come.

As acting director of Spacelab, Rigell said he looks forward to the day when the United States and several European countries will form a permanent space station.

The next Space Shuttle flight scheduled for this fall will transport equipment for the jointly owned Spacelab, he said. (TODAY, 5-5-81)

<> Preparations are under way at Kennedy Space Center for installation of the scientific payload for the second flight of the Space Shuttle Columbia, which will be launched in late September/October.

The payload -- OSTA-1 (Office of Space and Terrestrial Applications - 1) -- is designed to demonstrate the Shuttle's capability as an operational space platform for scientific and applications research. The experiments most of which are being provided by the NASA office, are concerned primarily with remote sensing of land resources, atmospheric phenomena and ocean conditions. They are:

1) Shuttle Imaging Radar (SIR-A). An imaging radar to test advanced technique for mapping geological structures important in oil and gas explorations.

2) Multispectral Infrared Radiometer (MSIRR). Will measure the solar reflectance of mineral-bearing rock formations.

3) Feature Identification & Location Experiment (FILE). Designed to discriminate between water, bare ground, vegetation, snow or clouds and thus be able to direct sensors to collect only wanted data.

4) Measurement of Air Pollution from Satellite (MAPS). Designed to measure the distribution of carbon monoxide at the altitude between 7, 5 and 11 miles.

5) Ocean Color Experiment (OCE). Designed to map algae concentrations which may indicate feeding areas for schools of fish and locate possible pollution in the oceans.

6) Night & Day Optical Survey of Lightning Storms (NOSL).

7) Heflex Bioengineering Test (HBT). A biological engineering experiment designed to determine the relationship between plant growth and moisture content in zero G. (DEFENSE DAILY, 5-5-81, p. 22, Vol. 116, No. 3)

<> NASA and the West German Ministry for Research & Technology have signed a Memorandum of Understanding confirming the general understandings for the terms under which NASA will furnish launch and associate services to Germany on a reimbursable and cooperative basis using the Space Shuttle. Specific Launch Service Agreements will be signed for each individual activity. West Germany to date has paid earnest money to NASA for two reimbursable Spacelab missions on the Space Shuttle -- one for materials processing and life sciences experiments and the second for astrophysics experiments. Germany also plans to use the Shuttle to launch its Rosat x-ray satellite in 1986. Private organizations in Germany have also reserved a total of 25 Small Self-Contained Payloads for Shuttle flight on a space-available basis. (DEFENSE DAILY, 5-5-81, p. 19, Vol. 116, No 3)

<> Mr. Schmitt. "Mr. President, in his address to a joint session of Congress last Tuesday, President Reagan said: 'The Space Shuttle did more than prove our technological abilities. It raised our expectations once more; it started us dreaming again.'

"The President's words are so true. I should like to cite an example of this. The Honorable Ronnie G. Flippo, U.S. Representative from the Fifth District of Alabama, and Mrs. Manuel (Jean) Lujan, the lovely wife of my distinguished New Mexico colleague, the Honorable Manuel Lujan, U.S. Representative from the First District of New Mexico, were so inspired by the flight of the Columbia that they combined their talents and composed a song, commemorating that flight. I request that the words of that song be included in the Record."

The text follows:

Salute to Space Shuttle Columbia's Maiden Voyage
(by Hon. Ronnie G. Flippo)

O'Lord my name is Columbia
And I'm perfect in every way
I can't wait to get back to America
Cause she gets better looking each day.
To know me is to love me.
Oh, I must be a hell of a plane.
O'Lord it's hard to be humble.

But I'm doing the best that I can.
There are those who say I'm not worthy
But as you can see on TV
My spirit is the same as America's
The home of the brave and the free.
I'll fly up there for our future,
For all of the World to see.
I'm Columbia, the son of a great people
And God keep America free.

And now that I'm so damn beautiful
And gained many admirers along the way,
Some remember when I was an ugly duckling,
My friends were Winn and Fuqua.
When I glide back to earth in my glory
With brave Crippen and Young guiding me
I can't help expressing my feelings
That this triumph is one for the free!

O'Lord but it's hard to be humble
Thru grumblings of funding and such
I've proved myself worthy and able
Columbia's era has punch.

I've started my journey at Kennedy
And orbited far far above.
I circled two days and six hours
And returned to the land that I love.

And now I am ready to labor
For the benefit of all mankind
The future looks brighter than ever
For me and for others behind.
O'Lord but it's hard to be humble
And it's only my mission to search,
To serve, to be there for the asking,
I salute all mankind down on earth.

(from the CONGRESSIONAL RECORD -- SENATE, S 4409, OFFICE OF LEGISLATIVE AFFAIRS -- LEGISLATIVE ACTIVITIES REPORT, 5-5-81, Vol. XIX, No. 28, [Attachment A])

**May 6:** A 22-year-old Rockledge man fell to his death Tuesday while working on a space shuttle launch tower.

The accident occurred at 2:30 p.m. when the worker toppled from pad 39B where construction crews are converting an Apollo-era gantry for future space shuttle launches, said NASA officials.

The Brevard County Sheriff's Department identified the victim as Anthony E. Hill, 22.

A NASA board of inquiry is expected to finish an investigation of the March accident sometime this week. A second inquiry board will be appointed to examine Tuesday's accident, said NASA spokesman Dick Young.

Hill was employed by Wilhoit Construction, a subcontractor to Briscoe Corp. of East Orange, N.J. Briscoe is the primary contractor for the conversion project.

When the accident occurred, 45 Wilhoit employees were assembling the rotating service structure that swings into place around the shuttle to service the spaceship before a launch, said project engineer Clifton Reeves.

"I was not there myself, but I understand that work stopped for some time after the accident," Reeves said. "I can't say what height he fell from. It's still under investigation. (SENTINEL STAR, 5-6-81)

<> A Hialeah firm has been awarded a $34,150 contract to manufacture the equipment that allows the Space Shuttle's payload bay doors to be opened and closed on earth.

Fandino & Sons, Inc., of 1111 E. 52nd St., Hialeah, will fabricate a counter-weight device used to permit opening and closing the doors in a horizontal position. The device supports the weight of the doors in normal earth gravity. It will be used at Vandenberg Air Force Base, California, from where the Shuttle is to be launched into polar (south-north) orbit, starting in the mid-1980's.

The contract is one set-aside for award to a small business firm.

The machinery is substantially the same as that now used in the Orbiter Processing Facility at KSC. (KSC NEWS RELEASE NO. 139-91, 5-6-81)

<> Satellite Television Corp., a wholly-owned subsidiary of Comsat, has requested reservations from NASA to launch two satellites on the Space Shuttle in 1985 to provide satellite-to-home subscription television.

STC plans to launch one operational and one spare satellite to provide pay television service in the eastern U.S. STC requestd approval from the FCC in December to begin construction of the two satellites, noting that it will take 3-4 years to have them ready for launch. FCC authorization to proceed with construction is required before STC can place any firm launch orders.

The FCC last month unanimously accepted STC's application for interim operating authority for the satellite-to-home television service.

STC chairman John A. Johnson said that the company would prefer to use NASA launch services "wherever possible," citing the "significant financial benefits of the Shuttle."

The STC satellites, however, will be built for launch both aboard the Shuttle and The European Ariane launch vehicle. The company said that neither the U.S. Delta nor Atlas-Centaur is suitable for its satellites. (DEFENSE DAILY, 5-6-81, p. 32, Vol. 116, No. 4)

**May 7:** Brevard County has the Space Shuttle. If Robert Truax has his way, Miami will have the "Volks-rocket."

The 63-year-old aeronautical engineer and retired Navy captain is determined to realize his dream of launching the world's first privately funded and produced manned rocket.

John Feeny, a vice president in charge of promotion for Truax's three-man firm in Saratoga, California, will meet with Dade County officials later this week to discuss making their launch from here.

"We've been offered launch sites all over the world, but we want to keep it an all-American project," said Feeny, a University of Miami graduate. "This is the perfect area. It seems a natural because Miami has had such bad publicity and this could help turn it around."

Truax added: "You want to know the truth? We've got to somehow pay for this project. I've got a quarter million dollars of my own money and another quarter million from other people who want their money back.

"One way to do it is to take advantage of the public interest that seems to be there and sell tickets to the launch site."

Truax said four of six tests of his rocket so far have been successful.

"I've been collecting parts over the years, just rescuing them from the junk heap, because I couldn't bear to see such beautiful machines melted down for scrap," he said. (TODAY, 5-7-81)

<> The iron worker who fell to his death Tuesday from a space shuttle launch tower should have been wearing a safety harness, construction company officials acknowledged.

"The normal procedure is for workers to put on a safety belt," said Thomas Kirby, supervisor for Wilhoit International Corp., a subcontractor on launch pad 39B, where iron worker Anthony E. Hill, 22, of Rockledge, died after plunging 100 feet from the metal gantry.

Kirby said Hill was not wearing the safety device when he fell from the structure Tuesday afternoon. Hill, one of 45 Wilhoit workers renovating the tower for shuttle launches, had been on the job about three months, Kirby said.

He was installing a handrail on the rotating service structure when a metal grate gave way underneath him, witnesses said. The grate fell only one level, but Hill plummetted to the cement base of the pad.

A NASA board of inquiry was appointed Wednesday to investigate the accident, but space center officials said it will probably be weeks before the board completes its report. (SENTINEL STAR, 5-7-81, p. 2-C)

<> The Bionetics Corporation of Hampton, Virginia, has been awarded a nine-month, $2,045,395 extension of its contract to maintain reference standards and to repair and calibrate electronic and mechanical test equipment at NASA's John F. Kennedy Space Center.

This is the fifth extension of the Bionetics contract and brings its total value since May, 1976, to $8,924,869. Bionetics is a small business firm.

The cost-plus-fixed-fee contract extension covers the period from May 1, 1981, through Jan. 31, 1982. (KSC RELEASE No. 141-81, 6-7-81)

<> Flowers Chemical Laboratories of Altamonte Springs, Florida, has been awarded a one-year, $45,374 contract by NASA's John F. Kennedy Space Center.

The contract calls for the laboratory to develop techniques that will allow more efficient and economical disposal of certain wastes that must now be treated as hazardous.

The waste in question is produced when a compound called Marshall Sprayable Ablative (MSA) is applied to the nose cones and aft-skirt fairings of the recoverable Solid Rocket Boosters that help propel the Space Shuttle toward orbit. An ablative substance is a form of insulation that protects by burning away as the SRB's, for example, move from lower to higher temperatures.

MSA is prepared by combining a powder with a liquid base containing solvents. It is then sprayed on the SRB sections to be protected. The leftovers from spraying and finishing must be disposed of as hazardous waste. Some waste is also produced when the rockets are being prepared for reuse.

If the solid ingredients in the waste could be separated from the liquid, the volume of hazardous waste would be reduced. Recovering the solvents from the liquid waste would further decrease its toxicity.

The contract is one set-aside for award to a small business firm. (KSC RELEASE NO. 142-81, 5-7-81)

**May 8:** Problems in manufacturing the Space Shuttle's External Tank will limit NASA to conducting a maximum of 36 Shuttle flights through 1985, the agency told the House HUD-IA Appropriations Subcommittee.

The agency had planned to conduct 48 Shuttle flights in the 1982-85 period, but 7 NASA missions were cut from that total by the revised FY '82 Reagan budget.

The missions, primarily commercial satcoms, that cannot be accommodated on the Shuttle, will be carried on expendable launch vehicles, primarily the Delta and also the Atlas-Centaur, acting NASA Administrator Dr. Alan Lovelace said.

He expressed confidence that the Shuttle and the expendable vehicles will meet the launch requirements.

Associate Adminisrator John Yardley projected ET production at from 25 to 36 tanks through 1985, and said he thought 36 is achievable. Lovelace, however, said that the agency is looking at a flight manifest of 34 Shuttle missions in that period. (DEFENSE DAILY, 5-8-81, p. 45, Vol. 116, No. 6)

<> The reusable insulation tiles on the Space Shuttle Orbiter Columbia experienced temperature levels during reentry "much lower than predicted," and, as a result, current estimates are that only 100 tiles will have to be replaced and 300 tiles repaired. An additional 100 tiles, identified as replacement candidates prior to the STS-1 flight, may also be replaced.

The overall repairs and modifications to Columbia required as a result of the first flight are described as minimum.

As for the damage to the launch pad, NASA says that damage was less than occurred on any Apollo launch. (DEFENSE DAILY, 5-8-81, p. 46, Vol. 116, No. 6)

<> It was a pioneering flight that opened a new arena for human accomplishment -- space.

Tensions mounted as the moment for liftoff neared.

And then...

"...five, four, three, two, one, zero. Liftoff. You're on your way, Jose," came the send-off from Deke Slayton at Mission Control.

A reassuring voice responded quickly: "Roger, liftoff and the clock is started. Reading you loud and clear. This is Freedom Seven."

Alan Shepard was off the ground and on his way to becoming the first American in space.

Tuesday (May 5th) marked the 20th anniversary of Freedom Seven's historic flight, and the birth of the U.S. manned space program.

Though Shepard's journey lasted only 15 minutes, it was the beginning of a great endeavor that would eventually land Americans on the Moon and lead to the creation of a new national resource which will enable the nation to use this new environment to its fullest -- the Space Shuttle.

At 9:34 a.m. on May 5, 1961, the slender black and white Redstone rocket roared to life.

With just about one percent the liftoff thrust of the Space Shuttle, and Redstone boosted a tiny Mercury spacecraft containing Shepard on a ballistic trajectory that would peak 116 miles above the Earth's surface and bring Freedom Seven to a splash-down in the Atlantic Ocean a little over 300 miles downrange from Cape Canaveral.

America's first manned space mission was an unqualified success.

Though it was long ago abandoned as an active site, the launch complex is now part of the sprawling Air Force Space Museum. It comes to life once again during frequent visits by those taking KSC guided bus tours and the Sunday drive-through tours of Cape Canaveral Air Force Station.

Across the Banana River, at KSC's Visitors Center, is the recently remodeled Hall of History, and a manned spaceflight exhibit which includes the first Mercury capsule flo . in space. It was an unoccupied craft successfully tested on a sub-orbital flight five months before Shepard's mission.

On display near the capsule is a Mercury spacesuit -- used by Astronaut Gordon Cooper.

The Freedom Seven Mercury capsule flown by Shepard is on exhibit at the National Air and Space Museum in Washington, D. C. and his suit is on display at the Johnson Space Center in Houston. (SPACEPORT NEWS, 5-8-81, p. 1, Vol. 20, No. 9)

<> Small business is big business at KSC, says Jack Dryer, Industry Advisor and Small Business Specialist in KSC's Procurement Office. Dryer's comments came as KSC prepares to join other NASA centers during Small Business Week, May 10-16.

Small businesses account for a large amount of KSC's contractor work, garnering 20,262 awards and contracts during FY 1980 at a value of $46.6 million. Further, KSC has awarded $40 million to small business firms through March of FY 1981, said Dryer, bringing the total to over $257 million since FY 1970. In those years as much as 60 percent of all small business awards went to Florida-based firms.

Among the small businesses currently under contract with KSC are: Expedient Services of Titusville, which provides roads and grounds services; BAMSI, a minority-owned firm which supplies key punch services, New World Services, another minority-owned firm which operates the technical and research library; McGregor-Werner, Inc., which furnishes publications, audio-visual and word processing services; Atlantic Technical Services, which handles mail and distribution services; Management Services, Inc., which operates chemical cleaning and component refurbishment facilities; Bionetics Corporation, which operates the calibration laboratory; the Unified Services, a minority-owned firm which supplies janitorial services. Various other small businesses currently furnish supplies or perform construction work at the Spaceport. (SPACEPORT NEWS, 5-8-81, p. 3, Vol. 20, No. 9)

<> The 18th Space Congress was called to order last week on twin notes of pride and practicality. The chord was sounded by two distinguished Congressmen, U.S. Representatives Bill Nelson and Don Fuqua.

Nelson, a longtime Space Congress figure, introduced Fuqua with an anecdote which reflected the pride both men felt during the desert landing of the Columbia.

As keynote speaker, Fuqua then accented the practical aspects of Space Shuttle operations.

"We must get down to what the practical uses of the Space Shuttle are," he said, "We must use it like an airliner to space."

Fuqua noted that many of those practical uses were as yet undreamed of, but predicted that they would be as diverse and innovative as the imaginations of the Space Shuttle's users.

As Chairman of the House Science and Technology Committee, Fuqua next observed that the key to an ongoing space program is funding stability, especially in the areas of research and development.

He said he believes that research and development programs which are promising should be continued and not be subjected to the whims of committees or administrations. Funding, he added, should not be based on the waxing and waning of interest by those outside the field.

Following the keynote address was a panel discussion chaired by John Yardley, NASA's Associate Administrator for the Space Transportation System. Yardley summed up the first Space Shuttle mission as a major success, but he noted certain areas for improvement.

These include determining why the flotation bags for two of the six parachutes to sink and be lost; finding out why the tumble valve on the external tank failed to open as it should have after tank separation; determining what caused a flight data recorder in the orbiter to fail and lose mission data; and determining what caused some of the thermal protection tiles to be damaged.

On the latter topic, Yardley explained that the tiles in general performed much better than expected, keeping orbiter skin temperatures more than 100 degrees cooler than predicted. Workers have so far found 303 tiles which were damaged in some degree, mostly small chips or gouges.

Other NASA panel members included Donald "Deke" Slayton, manager of the orbital flight test program, Daniel Germany, who manages the orbiter production program, Glynn Lunney, manager of the STS Operations Program Office, and Aaron Cohen, who manages the Space Shuttle Orbiter Project Office.

Slayton responded to earlier speculation that one of the flight test missions might be eliminated due to the success of the first mission.

He reminded the audience that the entire program was success oriented, and that the planners had set four as the minimum number of test missions needed.

Slayton did, however, say that the first landing on a concrete runway at Edwards and the first landing at KSC might be moved up by one flight, possibly occurring on the third and fourth missions respectively.

Other panel members outlined the preliminary results of STS-1 and gave predictions for traffic flow, orbiter production schedules and future improvements to the Space Shuttle during their presentations. A final panel member represented the Space Shuttle commercial user. John Almond, Vice President of Engineering for TELESAT of Canada spoke of the concerns and troubles caused by Space Shuttle launch delays, but also said that things look very good for the future. (SPACEPORT NEWS, 5-8-81, p. 2 & 6, Vol. 20, No. 9)

**May 9:** The Space Shuttle's launch helped boost attendance to an April record at Kennedy Space Center, NASA reports.

April's visitors totaled 198,688 at KSC's Visitors Center, operated under contract by TWA Services Inc. That is more visitors than for any other April since the center opened in 1966. It is 26 percent higher than April 1980.

KSC Tours has set attendance records every month this year.

NASA and TWA officials both give credit to the Shuttle for renewed interest in the space center, which has been visited by 20 million people since its opening. (TODAY, 5-9-81)

**May 11:** Sen. William Proxmire (D-Wis.) has criticized NASA for its management of the Tracking & Data Relay Satellite System (TDRSS) program, which he says has increased in cost by over $1 billion. He cited a report by the NASA inspector general which said that the ten-year-old lease of the TDRSS spacecraft will cost $2.156 billion instead of the $842

million originally estimated. Proxmire called the satellite system "overpriced, overweight, oversold and overdue." He pointed out that the TDRS can only be launched by the Space Shuttle, and that the delay in launching the satellites is costing the taxpayers $1 million a day. The first TDRS is now scheduled for launch in January 1983 on the third operational Shuttle flight, some 26 months behind schedule. (DEFENSE DAILY, 5-11-81, p. 60, Vol. 116, No. 8)

<> Shuttle project and launch site managers here are weighing the needs of launch crew rest against orbiter vehicle turnaround and shuttle funding requirements to help target liftoff of Columbia's second flight test mission, to be piloted by astronauts USAF Col. Joe H. Engle and Navy Capt. Richard H. Truly. A mid- to late-October launch would be the earliest date possible if an optimum launch crew rest schedule is followed.

First post-flight turnaround of the shuttle orbiter Columbia will take significant steps toward space airline type operations as many tests traditional for earlier space vehicle processing here are deleted. Inherent autonomy of the orbiter and system redundancy will allow this approach, and cost considerations mandate it. There are many older members of the Kennedy launch team here who consider this approach controversial so early in the shuttle flight program. Younger launch team members who have had less experience with the Saturn/Apollo system have fewer reservations over test reductions.

The shuttle orbiter Columbia arrived here on its Boeing 747 carrier aircraft April 28 to begin at least a 25-week preparation for the second liftoff.

Manpower fatigue and morale have become important considerations for pacing Space Transportation System (STS-2) processing, especially in light of the planned reduction in vehicle tests. "Our launch director, center director and shuttle project director are all concerned with fatigue and morale. We are not sure we can work the launch team on three shifts, seven days a week for the second flow as was done on the first," Glenn Parker, orbiter manager for the Kennedy Shuttle Projects Office, said.

Parker said there is strong consideration here to adopt a two-shift six-day per week work schedule except in critical areas. Some persons would be placed on a two-shift five-day

per week schedule under such a concept. Under three-shift, seven-day operations the STS-2 vehicle processing flow would last at least 25 weeks from vehicle roll-in to the Orbiter Processing Facility through the second liftoff from Pad 39A. That schedule would place liftoff of Engle and Truly about October 19 based on Orbiter Processing Facility roll-in April 29. (AVIATION WEEK & SPACE TECHNOLOGY, 5-11-81, p. 50, Vol. 114, No. 19)

**May 13:** The Kennedy Space Center is among the NASA centers and government agencies observing the week of May 10 as Small Business Week.

By presidential proclamation, the week honors the 12 million small businesses which provide the livelihood of more than 100 million Americans.

As part of the KSC observance, Fred Boles, KSC Procurement Officer, will make a presentation on KSC's contribution to the small business community at the Brevard Community College Lecture Auditorium, Room 104, Vocation Center, in Cocoa, on Saturday, May 23, from 9:30 - 11:30 a.m. The presentation is open to the public without charge.

During Fiscal Year 1980, KSC issued $46.2 million in more than 20,000 awards to small businesses. Of that amount, about $19.2 million went to Florida-based firms, many of them in Brevard County.

Thus far in Fiscal Year 1981, KSC has awarded over $40 million to small business concerns. Since Fiscal Year 1970, the value of awards to small business concerns by KSC has exceeded $257 million.

In a memorandum to center managers, KSC Director Richard G. Smith noted: "To implement this new emphasis on the Small Business Program, all personnel who participate in the requirements process - engineers, logisticians, procurement personnel - must be alert to the small business opportunities available.

"Your understanding and support of our efforts to place awards with small business firms, whenever possible, are essential to its success. Please join with me in supporting this segment of the private enterprise sector." (KSC RELEASE NO. 145-81, 5-13-81)

<> A record number of major corporations are taking a look at Brevard County -- and many of them apparently like what they see.

Enthused by an unusually high number of industrial prospects, county development officials predict that 1981 may produce a bumper crop of new industrial plants on the Space Coast. They say recent announcements by International Telephone and Telegraph Corporation and Hughes Aircraft Company may be only the beginning.

Unlike the job explosion of the late 1970s that zeroed in on South Brevard while virtually ignoring the rest of the county, this year's prospects are expected to be much more evenly distributed. Titusville and Central Brevard are getting their share of corporate lookers -- some of them firms whose work relates to NASA's Space Shuttle at nearby Kennedy Space Center.

"Our activity has never been higher," said John E. McCauley, executive director of the county-funded Brevard Economic Development Council. "It looks like it will be a very good year." (TODAY, 5-13-81)

<> The possibility of a manned U.S. mission to land on Mars by the year 2000 is once again on the long-range drawing boards of NASA planners.

The manned Mars landing mission was given major consideration in the late 1960's as a possible follow-on to the Apollo lunar landing project, but has fallen by the wayside for the more productive and broader-based Space Shuttle and planned Space Station projects. Development of the Shuttle and Space Station projects will, of course, give the U.S. a major new capability to effectively conduct the manned Mars mission. (Another possible impetus, which some say is a good possibility, is the initiation of a Soviet manned Mars project.)

One group that is taking such a mission into account is NASA's Solar System Exploration Committee, which advises NASA on which future planetary, solar and other solar system mission the agency should conduct. The committee is slated to report to the agency this summer on which solar system exploration missions should be conducted after those

presently approved and is basing part of its recommendations on the possibility of the manned Mars flight by the year 2000 -- considering which missions should be conducted as precursors to that mission.

NASA due to budget limitations has dropped plans for any follow-on unmanned Mars missions for this decade, but is studying a number of possible missions for the early 1990's, including a Mars Sample Return Mission and a combined Sample Return/Rover mission. (DEFENSE DAILY, 5-13-81, pp. 71 & 72, Vol. 116, No. 9)

<> NASA's John F. Kennedy Space Center has awarded a contract to the Florida Institute of Technology, University Boulevard, Melbourne, for research on improvement of systems to remove the vapors of hypergolic liquids.

The value of the one-year contract, which calls for a preliminary design of the improved system, is $62,695.

Hypergolic propellants are used in the Space Shuttle's Orbital Maneuvering Subsystem and its Reaction Control Subsystem. They are also used on unmanned vehicles such as the Delta.

Hypergolic propellants are liquids that ignite on contact, without an ignition system. This easy start and restart capability makes them desirable for spacecraft maneuvering systems. They are also easy to store because they do not have extreme temperature requirements. Some other rocket propellants, such as liquid hydrogen and liquid oxygen must be kept extremely cold.

The vapors from hypergolic liquids are extremely toxic, and working with them requires stringent safety precautions. (KSC RELEASE NO. 147-81, 5-13-81)

**May 14:** ACL-Filco Corporation, 3333 West Warner Avenue, Santa Ana, California, has been awarded a contract of $2,190,844 by NASA's John F. Kennedy Space Center to produce 26 control panels used in processing Space Shuttle orbiters between missions.

The panels and associated hardware are used in draining hypergolic propellants from the orbiter's Auxiliary Propulsion System and the Forward Reaction Control System, securing those systems and checking them out. When the Space Shuttle returns from orbit some fuel remains in the systems.

ACL-Filco is a small business firm. The work is to be completed between mid-May, 1981, and October, 1982. (KSC RELEASE NO. 144-81, 5-14-81)

**May 16:** The second flight of the space shuttle Columbia, the reusable rocket plane that returned the United States to space glory last month, has been scheduled for Sept. 30, the space agency announced Friday.

The four-day, five-hour orbital voyage will mark the first time a spaceship has flown more than once. The Columbia again will land at Edwards Air Force Base, California.

Officials at the Kennedy Space Center said they originally planned to launch astronauts Joe Engle and Richard Truly Oct. 18, but advanced the date to Sept. 30 by deleting unnecessary tests.

Launch by Sept. 30, the last day in the fiscal year, would enable NASA to meet a commitment to Congress: two Shuttle flights in fiscal 1981. (THE MIAMI HERALD, 5-16-81)

**May 19:** Seven years after joining NASA as head of the effort to develop the Space Shuttle, which successfully made its maiden flight a month ago, John F. Yardley, NASA's associate administrator for space transportation systems, has announced his intentions to leave the agency effective May 30 to return to McDonnell Douglas Astronautics Co. as president.

Largely unsung, he was the key man in the development of the Space Shuttle. His resignation following the successful Shuttle flight was not unexpected.

Yardley was vice president and general manager of McDonnell Douglas Astronautics' Eastern Division prior to joinging NASA. He joined McDonnell in 1946 as a structural engineer and later served as project engineer for design of the Mercury spacecraft (1958-60), as launch operations manager for the Mercury and Gemini spacecraft (1960-64) and as technical director for Gemini (1964-67).

The post of associate administrator for space transportation systems will be taken by L. Michael Weeks, who was named Yardley's deputy in November 1979. Prior to that, Weeks had served since 1975 as manager of advanced systems development for General Electric's Reentry and Environmental Systems Division.

Weeks began his career at McDonnell Aircraft Corp., where he worked on the Mercury program under Yardley. He later served at Aerospace Corp., working on the Manned Orbiting Laboratory (MOL) program, and was vice president and general manager of LTV Corp.'s Missile and Space Division. (DEFENSE DAILY, 5-19-81, p. 99, Vol. 116, No. 13)

<> Boeing Services International, Inc. has won a supplemental agreement to an existing contract with the space center. The agreement covers a modification to the contract to permit accelerated efforts in support of Space Shuttle launch preparations.

The value of the cost plus award fee agreement is $5,075,000 and brings the total value of the Boeing contract at KSC to $187,343,227. (KSC RELEASE NO. 153-81, 5-19-81)

**May 20:** President Reagan Tuesday honored America's space shuttle astronauts, telling the mission's commander during an Oval Office award ceremony, "I'm glad you're not a fella who believes in keeping your feet on the ground."

A beaming President and Vice President George Bush welcomed Columbia spacecraft commander John Young, the shuttle's pilot, Navy Cmdr. Robert Crippen, and their families to the White House. The astronauts were honored for their successful mission in Earth orbit April 12-14.

The President then attended a luncheon for 21 past and present U.S. astronauts in the Rose Garden.

Young and Crippen received the Distinguished Service Medal Citation from the President, and acting NASA administrator Alan Lovelace received the Presidential Citizen's Medal.

In addition, Young, who flew on America's first two-man orbital spacecraft in 1965 in the Gemini program, received the Congressional Space Medal of Honor. He is the only person to fly in space five times.

Among those attending the luncheon were William Anders, Neil Armstrong, Alan Bean, Frank Borman, Scott Carpenter, Eugene Cernan, Michael Collins, Charles Conrad, Gordon Cooper, Sen. John Glenn (D-Ohio), Fred Haise, James Lovell, James McDivitt, Walter Schirra, Sen. Harrison Schmitt (R-N.M.), Russell Schweickart, Alan Shepard, Donald Slayton, Thomas Stafford and the two Columbia astronauts, Young and Crippen. (THE MIAMI HERALD, 5-20-81, p. 14A)

**May 21:** Gerald D. Griffin, Acting Associate Administrator for External Relations at NASA Headquarters and Deputy Director at the Kennedy Space Center, will relinquish his Headquarters duties effective June 1 and return to full-time duty at Kennedy Space Center, Florida.

Griffin has been serving in the dual role since July 7, 1980. Russell Ritchie, the Deputy Associate Administrator for External Relations, will manage the office until a successor is chosen.

While at Headquarters, in addition to his External Relations duties, Griffin served as the NASA Transition Officer during the Carter-to-Reagan transition. He also played a key role in planning NASA's external activities related to the first flight of the Space Shuttle on April 12-14.

Since assuming the Headquarters post, he has spent about 25 percent of his time at Kennedy Space Center.

Dr. Alan M. Lovelace, NASA Acting Administrator, said: "Gerry Griffin has done an outstanding job in handling the responsibilities of two demanding jobs simultaneously. His duties as Transition Officer, coupled with the complex planning required for the first Shuttle Flight, caused us to keep him in a dual role for about a year at considerable hardship to Gerry and his family. I very much appreciate his efforts and the cooperation of the KSC management team that allowed this arrangement to work." (KSC RELEASE NO. 81-67, 5-21-81)

**May 22:** Rocco Petrone, director of Marshall Space Flight Center during 1973-74, has been hired by Rockwell International as executive vice president of the space transportations systems group.

Petrone started his career at Redstone Arsenal then moved to launch operations at Cape Canaveral and Kennedy Space Center, Florida. He returned to Huntsville as Marshall's deputy director then director during the center's worst period of lay-offs.

After leaving the space program he became chairman and chief exectutive of the National Center for Resource Recovery outside Washington.

A Rockwell spokesman said Petrone's responsibilities will not involve activities under contract to Marshall. (HUNTSVILLE TIMES, 5-22-81)

<> Dallas Gillespie, Deputy Comptroller, was recently appointed as Chairperson of the Equal Opportunity Advisory Committee. He will serve in this capacity for one year.

The EOAC is made up of a cross-section of the NASA workforce by grade, sex, ethnic background and level of authority from each Directorate. Additionally, each employee group with exclusive recognition is represented on the Committee.

Members of the Committee and its Chairperson are appointed by the Center Director following recommendation by their Directorate. The primary responsibility of the EOAC is to furnish advice and assistance to Center management for program improvement and for evaluating program effectiveness.

This committee serves as a two-way conduit between KSC management and employees to surface issues and ideas and provide feedback for plans and concepts. Some issues the EOAC Committee has dealt with in the past include the use of the Reassignment Opportunity Bulletin vs. Merit Promotion Announcements.

Another issue discussed concerned women employees with administrative degrees employed in clerical positions not being able to compete for higher grade jobs.

Issues of discussion for the coming year will include but not be limited to:

* Continuation of ethnic group programs (Black History Week, Hispanic Week, etc) vs. Proclaim Your Heritage Week.

* Formation of a Black Employees Working Group.

* Formation of a Language Skills Development Program.

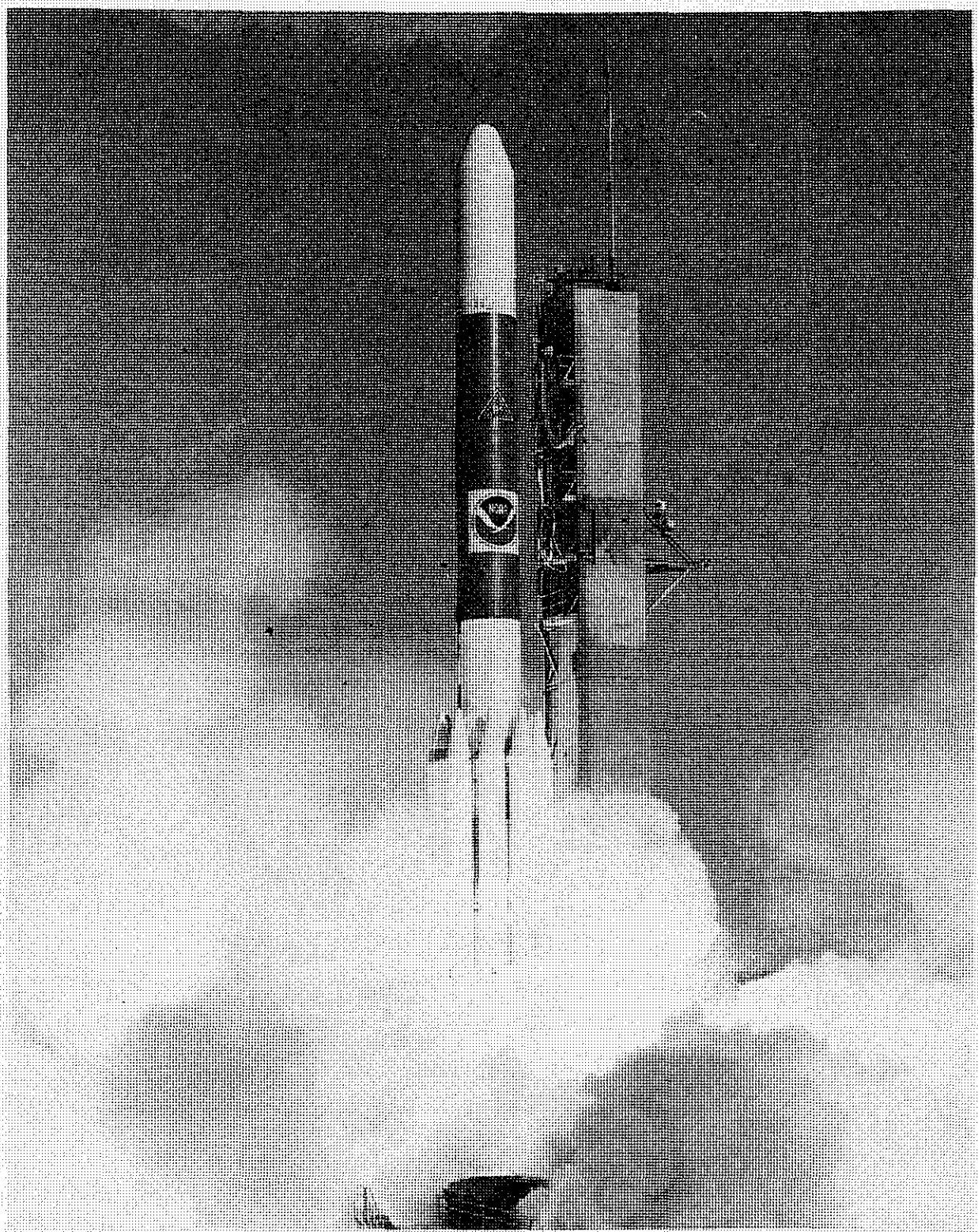
* Development of the KSC Affirmative Action Plans as it relates to hiring and promotion goals for minorities, women and the handicapped.

Members of EOAC ask for your support to ideas and encouragement to make this committee a success. (SPACEPORT NEWS, 5-22-81, pp. 2&6, Vol. 20, No. 10)

<> Acting NASA Administrator Dr. Alan Lovelace told the House Science & Technology Committee Wednesday that the project the U.S. needs to proceed with now to build on the capabilities provided by the Space Shuttle is the Space Operations Center (SOC) -- a modular, permanently manned orbiting Space Station.

"I think that the sooner the United States can get on with that the better," Lovelace said.

The FY '82 NASA budget contains less than $1 million for continuation of Phase A studies on the Space Operations Center. NASA has proposed to initiate development of the SOC Core and its modules in FY '84. (DEFENSE DAILY, 5-22-81, p. 124, Vol. 116, No. 16)



The launch of Goes-E aboard a Delta rocket on May 22, 1981.

<> Launch of the NOAA GOES-E weather satellite, which was postponed Thursday because of a circuit breaker malfunction in an ARIA tracking aircraft, was postoned again this weekend because of a potential vibration problem. Testing conducted by Hughes Aircraft, GOES prime, on the GOES-F satellite indicated that launch vibrations could potentially cut off the power to the GOES-E's new Visible Infrared Spin-Scan Radiometric Atmospheric Sounder...instrument. NASA is now looking at whether it has to de-mate the spacecraft from its Delta launch vehicle. A new launch date has not been set. (*DEFENSE DAILY*, 5-22-81, p. 126, Vol. 116, No. 16)

<> There was more pomp in Washington and bigger crowds in Chicago. But Thursday it was like coming home, according to space shuttle commander John Young.

"The fireworks in Chicago were only one-millionth of the fireworks that went on here in April," Young told 2,000 space center workers who gave him a standing ovation. "Crip and I were thankful we didn't have a rear-view mirror."

Looking back on the launch that catapulted the Columbia into orbit, pilot Robert Crippen said the shuttle was not the "turkey" some critics imagined.

"I'm here to tell you that turkey really flies nice," Crippen said. "That's a superb flying turkey."

Crippen and Young toured the processing hangar where the Columbia is being readied for a Sept. 30 launch. Large portions of the spaceship have been dissected or dismantled, and the shuttle's two orbital maneuvering engines have been removed for refurbishment.

Before Columbia rolls to her launch pad again in late August, Rockwell International technicians must replace 300 tiles and strengthen 500 more. There will also be a new outer coating on 2,000 tiles that were slightly damaged during the launch and landing.

Stacking began this week on the solid-fuel rocket boosters that will carry the Columbia aloft on its second flight. Final mating of the orbiter, rocket boosters and an external fuel tank is scheduled for August.

Some technicians hardly looked up from their tasks as Young and Crippen clambered up metal catwalks for a better look at the spacecraft that carried them 37 times around the Earth.

Dr. Robert Gray, manager of shuttle projects, apologized for the lack of fanfare.

"We have no motorcycle escorts or ticker tape parades," said Gray. "But we do have the launch pad and the shuttle. No one else has shown you that yet."

"It's been a pleasure doing business with you. We want to thank you for taking such good care of the flying machine," he said.

At a noon ceremony, the astronauts helped launch a new stamp series commemorating the space shuttle flight. Thousands of stamp collectors mobbed the visitors center to purchase the stamps on the first day of issue. One dealer even flew in from West Germany to snap up $12,000 worth of stamps. (SENTINEL STAR, 5-22-81, p. 3A)

**May 23:** The space agency finally carried out the launch of the GOES-5 sophisticated weather satellite late Friday after delaying it three times.

The satellite shot into space at 6:29 p.m. EDT atop a fire-spitting Delta rocket.

If all goes well, the Geostationary Operational Environmental Satellite No. 5 will be parked 22,300 miles above the equator near the coast of Ecuador. It will give forecasters pictures and sophisticated readings on weather patterns across eastern North America, Central America, South America and a large area of the Atlantic Ocean.

The GOES-5 is a replacement for a National Oceanic and Space Administration satellite launched February 6, 1975. The more sophisticated satellite becomes the second of a new series that carries a telescope-type instrument that will improve weather forecasting, particularly on the development of storms and tornadoes, officials said.

GOES-4 was launched over the Pacific Ocean last September. (SENTINEL STAR, 5-23-81, p. 9-C)

<> Like all heroes should, astronaut John Young ate all his carrots. In fact, he ate almost everything on his yellow, plastic Princeton Elementary School cafeteria plate except the tiny American flag atop the strawberry shortcake. He didn't finish his peas either.

Making a triumphant return to his hometown of Orlando Friday after successfully piloting the space shuttle Columbia, Young probably could have had his pick of restaurants for lunch. The city and its restaurants were his.

But the tightly choreographed schedule of six stops in seven hours left little time for lunch anywhere but the basement cafeteria of Young's old elementary school.

The sixth-graders with whom he shared lunch were clearly inspired by his astronautical feats and obviously impressed by his presence, but not enough to follow his example and eat all their carrots. Most cleared their plates of the turkey, mashed potatoes, gravy and rolls, but left their vegetables unmolested.

Twelve-year-old James D'Ortano, sitting next to Young, hardly touched his lunch at all. The youngster spent the entire lunch hour quizzing Young about his space shuttle flight, being an astronaut, and other things more exciting than vegetables and yellow gravy.

"He said when he flew the Columbia, at first it was sort of scary, then after that it was like riding in a car," James said. (SENTINEL STAR, 5-23-81, p. 12-A)

<> The 154th Delta rocket to leave the ground since 196[illegible] cleared its pad and the Earth's atmosphere Friday, carrying a National Oceanic and Atmospheric Administration weather satellite successfully into a preliminary orbit.

Although the GOES-E (Geostationary Orbital Environmental Satellite) had been nicknamed the "No-GOES" because of a series of launch delays, the Delta and its $16 million payload worked just as the engineers said it would.

"Let me say that's the way we like to do it: clean, simple and by the textbook all the way," said Charles Gay, KSC's director of Deltas and Atlas Centaurs.

In fact, the rocket launched from Cape Canaveral Air Force Station at 6:29 p.m. worked a little too well. Its first stage was a little "hot" -- aerospace jargon for too fast. The speed was corrected automatically by the rocket when the second stage cut off seven seconds early, Gay said.

From a stationary vantage point 22,300 miles above Columbia, South America, the infrared and camera eyes of the satellite will keep a watch on the Caribbean Sea, the Gulf of Mexico and the Atlantic Ocean to monitor the development of weather, especially hurricanes. It is the GOES satellite that provides the weather photographs seen on television and in newspapers. (TODAY, 5-23-81)

**May 24:** Leaving its bright orange perch by the ocean behind, an Atlas Centaur rocket Saturday ferried an international communications satellite from Cape Canaveral Air Force Station's launch complex 36B to a new home high in space.

Although 20 minutes late, the 6:42 p.m. launch of INTELSAT 5 satellite was picture perfect, blazing a flaming trail across an azure sky. Then, about 50 seconds into flight, the rocket suddenly laid a five-second-long, snake-like contrail as it passed through an area of humid atmosphere.

Earlier it had appeared the INTELSAT would sit. An operator on the control panel inadvertently flicked the wrong switch less than two minutes from T-Zero. But he caught and reported his mistake, and the count was recycled back to the five-minute mark.

After systems were checked, the rocket was launched with less than 60 seconds to spare before the first launch slot ran out -- "A real cliff hanger," said one engineer.

Once in stationary orbit over the Atlantic Ocean, the satellite, second in a series of a dozen INTELSAT 5 satellites, will transmit signals back and forth among the Americas, Europe, the Middle East and Africa. The largest satellite of its kind, an INTELSAT 5 can transmit some 12,000 phone conversations plus two color television programs.

INTELSAT is a 106-nation organization in the process of setting up a worldwide satellite communications system. Nearly two-thirds of the world's transoceanic signals are carried over INTELSAT satellites.

The INTELSAT 5 series will include satellites in stationary orbits above the Atlantic, Pacific and Indian oceans. The total capacity of the series, including spares will be 153,000 telephone conversations and 24 television channels.

Manufactured by Ford Aerospace & Communications Corp., with the help of an international team of aerospace manufacturers, the average cost of an INTELSAT 5 is about $34 million. INTELSAT paid NASA $42 million for the launch. (TODAY, 5-24-81)

**May 27:** NASA now estimates that the cost to complete development of the Space Telescope will be $700 to $750 million in FY '82 dollars, which compares with the original estimate of $540 million to $595 million in FY '82 dollars, according to the Senate Commerce Committee. (DEFENSE DAILY, 5-27-81, p. 143, Vol. 116, No. 18)

**May 28:** NASA calls it a "getaway special" and the list of customers ranges from movie director Steven Spielberg to a Las Vegas casino and the government of West Germany.

So far, 290 space fans, groups and governments have paid $500 cash deposits to rent space in the cargo bay of the space shuttle beginning in the 1982 or early 1983 to send small experiments into orbit.

High school students in Camden, N.J., for example, plan to send an ant farm up to see if the zero-gravity atmosphere affects insect social organization.

The "getaway special" -- which comes in three sizes and costs $3,000 to $10,000 -- was conceived in 1976 by the space agency to get the public involved in the shuttle program.

To qualify for passage, customers must show their experiment has some scientific purpose. (THE MIAMI HERALD, 5-28-81)

**May 29:** The FY '81 supplemental appropriations bill approved by the Senate last week includes a $33.4 million reduction in the amount requested by the Reagan Administration for NASA Research & Development.

The bill calls for a recission of $37.9 million from the Carter Administration's FY '81 NASA R & D budget -- compared to the $4.5 million recission recommended by the Reagan Administration and approved by the House Appropriations Committee.

The key action in the Senate bill is the denial of the transfer of $60 million of Space Science & Applications funds to the Space Shuttle.

At the same time, the Senate bill restores $14.6 million for the International Solar Polar Mission, $3 million for the Solar Electric Propulsion Stage, $3 million for Materials Processing, $2 million for Technology Utilization and $4 million for Aeronautical R & T which the Reagan Administration proposed to eliminate. (DEFENSE DAILY, 5-29-81, p. 159, Vol. 116, No. 20)

<> NASA's John F. Kennedy Space Center has awarded a one-year, $1,121,274 contract extension to Atlantic Technical Services, 1203 Charles Street, Longwood, Florida.

The contract extension is for the second year of providing mail and distribution services in support of NASA and contractor elements at the Kennedy Space Center and covers the period from May 1, 1981, through April 30, 1982.

The new award brings the aggregate value of the parent contract to $1,898,566. Atlantic Technical Services is classed as a small business firm. (KSC RELEASE NO. 158-81, 5-29-81)

**May 30:** If you haven't been out to Kennedy Space Center lately to see the visitors center, you're in for a pleasant surprise. It has grown bigger and better in recent months.

And to show Brevard County community leaders how much bigger and better the state's fourth most popular attraction has become, NASA and TWA Services Inc., the company that runs the center, took about a 100 merchants and officials through the new facilities Friday.

The most obvious addition is a 224-foot-long Saturn 1-B rocket that makes the other rockets around it look as if they were bought at a fireworks stand in South Carolina.

TWA Services, as part of a 10-year concession agreement with NASA, is paying a Winter Park contractor $64,000 just to paint and refurbish the rocket.

H.B. Chambers, vice president and general manager of TWA Services, told the leaders the firm is also spending: $610,000 to make additions to the cafeteria, $230,000 to improve the sewage treatment plant, and $139,000 for a preliminary engineering and design report.

Chambers also announced plans to build a 500-seat theater for lectures and demonstrations, and a 440-seat movie theater, with a five-story high screen using 70 mm film shot by IMAX Corp.

Only a few such theaters in the world use the special film and screen. The theater at Circus World, west of Orlando, uses the special "you-are-there" IMAX film.

IMAX is now making a film of the first Space Shuttle mission, Chambers said.

Besides housing two theaters, the building will have 10,000 square feet of space for additional exhibits.

A new souvenir and sales building will also be built, and the present souvenir building will be converted into a restaurant, Chambers said. TWA Services' expansion costs will be about $8.5 million.

The tour facility operates at no cost to the government, and each year a portion of the earnings is reserved for improvements.

After telling the leaders TWA Services' plans, Chambers bragged about how well the visitors center is now doing:

"Nationally, tourism is down over 15 percent, and yet with no Shuttle for the public to see, this month we will be 39 percent ahead. In peak periods our personnel complement periodically reaches 375...Our 1981 payroll budget is $4.4 million.

"In 1980, our total expenditures amounted to $5.2 million, and construction commitment to $836,000.

"The majority of this money is spent in our community. When estimating our 1981 gross income...the impact on the Florida economy in the in-state expenditures of dollars at the supermarket, barbershop, filling stations, motels, restaurants and elsewhere is $72 million," Chambers said. (TODAY, 5-30-81)

**June 1:** Shuttle orbiter Columbia's aerodynamic smoothness during reentry was five times better than design specification, allowing a much cooler reentry and thus preventing more significant heat damage to thermal protection system tiles that were chipped and gouged by debris from the Shuttle's external tank during ascent.

Based on preflight reentry unknowns, thermal protection system engineers said they would have had a difficult time clearing Columbia for flight had they known in advance the Martin Marietta tank was going to produce the debris shower that occurred April 12 during first launch of the shuttle system.

"Fortunately, we proved we are not very sensitive to debris, at least for this particular reentry," according to Robert Dotts, thermal protection subsystem manager for the Johnson Space Center, who is overseeing detailed tile assessment activities in Kennedy's Orbiter Processing Facility here. A tank debris study team has been formed, and at a minimum, cameras will be added to the vehicle on the second flight to observe any tank debris activity."

Durability of the tiles, proved under the damaging conditions and launch and reentry stresses of first flight, is an important factor in achieving cost-effective orbiter turnaround as the U.S. builds toward routine, airline-type operations in space with the shuttle.

"It looks like this is a 100-mission vehicle after the first flight. It has exceeded our wildest estimates," the thermal protection system manager said. "We will be able to fly the second shuttle mission with very little engineering analysis." (AVIATION WEEK & SPACE TECHNOLOGY, 6-1-81, p. 40, Vol. 114, No. 22)

**June 2:** The "hottest real estate on Earth" may lie 22,300 miles above the equator in the exclusive domain where satellites whirl in silent procession.

This is geosynchronous orbit, a narrow corridor in space that allows satellites to "hover" above a fixed location on Earth. The demand for such "parking spots" above both hemispheres is booming, and experts say the traffic jam will get worse before the end of the decade.

Of the 1,101 satellites now in orbit, only 10 percent are in geosynchronous orbit. The rest travel at lower altitudes, circling the Earth up to 16 times a day.

In 1968 only 10 satellites occupied geosynchronous orbits. There are now 110 geosynchronous satellites, and the count is expected to climb to 300 in the next four years. The space shuttle, during its first 40 missions, will carry at least 11 geosynchronous satellites.

"It's the sweet spot," says one NASA official. "It's where everybody -- including the military -- wants to be."

Theoretically, an almost unlimited number of satellites could occupy the vast flyway without colliding. But because communication satellites have the unneighborly tendency to jam each other, they must be spaced 1,500 miles apart to avoid interference.

There are 21 prime spots above the Western Hemisphere for communication satellites; twelve are already taken by American and Canadian satellites, and the remainder will probably be filled by the end of the decade.

The United States occupies eight of these satellite slots, and the Federal Communication Commission has authorized use of six more geosynchronous locations by the mid-1980's. Still more geosynchronous satellites are awaiting FCC approval to launch.

Canada has four locations locked up and may require more satellite spots in the future. Latin American nations have launched no satellites yet but are eagerly staking out their shares of the orbital parking lot.

On the advice of the State Department, the FCC decided to leave three spaces open for Latin America. (SENTINEL STAR, 6-2-81)

**June 3:** Following a users conference late last week, NASA has now made flight assignments for the 34 Space Shuttle flights it is scheduling through 1985 (including four test flights), a decrease of 14 flights from the 48 planned in December.

Seven of the flights that were eliminated represented NASA missions that were delayed by budget cuts or combined into single launches. The other missions were bumped on the basis of which had been scheduled first, with missions previously scheduled for 1985 pushed into 1986. These include Syncom 4 & 5, two Australian satellites and satellites for Luxembourg and Italy. The reason for delaying these missions is lack of confidence that enough lightweight tanks could be built in time.

Dr. Stanley L. Weiss, NASA's associate administrator for the Office of Space Transportation Operations, said yesterday that the users conference was "clearly upbeat," that there was an increased level of confidence in the Shuttle as a result of the successful STS-1 flight and that users were more anxious to stick to the Shuttle rather than move to expendable vehicles. He said the users now feel that they will fly close to when they want to on either the Shuttle or an expendable (Delta or Atlas-Centaur). (DEFENSE DAILY, 6-3-81, p. 184, Vol. 116, No. 23)

<> Lockheed Missiles & Space Co. says that the reusable LI-900 and LI-2200 (Lockheed Insulation/9 pounds and 22 pounds per cubic foot) silica tiles developed for the Space Shuttle has potential application as an insulation for aircraft turbine engines, as well as for protective fire proof walls. The company adds that an automobile manufacturer wants to look at using the LI-900 material as insulation for car and truck engines. Lockheed emphasized that any possible commercial application of the tiles are downstream; current emphasis is on manufacturing tiles for upcoming Shuttle flights. (DEFENSE DAILY, 6-3-81, p. 183, Vol. 116, No. 23)

**June 4:** What's bad news for the Kennedy Space Center's Shuttle is good news for rocket engineers across the river at Cape Canaveral Air Force Station.

The reduction in the number of Shuttle flights over the next four years from 44 to 30 means that more Deltas and Atlas Centaurs will be launched.

Just how many more Deltas and Atlas Centaurs will be launched won't be known for about 30 days, said Joe Mahon, NASA's director of expendable launch vehicles in Washington, D. C.

Mahon explained customers have 30 days from last Tuesday, when a users' conference ended, to decide whether they want to reserve a throwaway rocket or use the Shuttle.

But at least 20 more Deltas and nine Atlas Centaurs will be launched from here through 1985 and an expected increase in demand will proably mean the Delta program will be extended into 1986, Mahon said. (TODAY, 6-4-81)

<> When the space shuttle Columbia blasts off again on a five-day mission this fall, it will carry a $100 million mechanical arm and half a dozen photographic and electronic eyes to view the Earth.

"From our parochial point of view, it's the time when the shuttle finally gets to do what it's supposed to do," said John Neilon, of the National Aeronautics and Space Administration. "And that is to carry useful experiments and cargo."

On Thursday, Neilon and other NASA officials showed off the cargo that will accompany astronauts Joe Engle and Richard Truly on the second shuttle flight, slated for as early as September 30.

Also on board will be a 50-foot mechanical arm, which in the future will be used to release and catch satellites. The device works much like a human arm.

The manipulator-arm system was developed and built by Canada for about $100 million and donated to the U.S. space program. An agreement between the two countries calls for NASA to buy the next three arms at a cost of about $65 million.

Bruce Aikenhead, who heads the manipulator program for the National Research Council of Canada, said the arm weighs less than 1,000 pounds and is 15 inches in diameter. The device "will be stretched out and its shoulder, elbow and wrist joints will be fully manipulated in space," he said.

The most important experiment will be one that will send and receive radar signals to create map-like images of the Earth's surface. These will be used to gather data on mineral resources. (SENTINEL STAR, 6-4-81)

<> Widows of two mechanics killed in a March 19 accident aboard the space shuttle Columbia plan to file separate suits against NASA totaling $23 million.

In a formal claim this week, attorneys representing the widow of Forest Cole asked the space agency for $3 million in damages for the "wrongful" death of her husband due to negligence. NASA has six months to deny, ignore or settle the claim before the suit is filed in federal court.

"I just feel like this is something that should never have happened," said Mrs. Cole, of Merritt Island. "My husband trusted them; he went into that nitrogen-filled room never dreaming there was danger."

Cole, 50, and John Bjornstad, 51, of Titusville, died after inhaling pure nitrogen in a shuttle engine compartment after a launch pad test. The two Rockwell International mechanics were part of a five-man crew sent back to work after an all-clear signal was sounded prematurely. (SENTINEL STAR, 6-4-81, pp. 1C & 2C)

**June 5:** From Broomfield, Ky.; from Brigham City, Utah; from Rockford, Ill.; from Hungtington Beach, Calif. -- bit by bit the 60,000 parts that make up the Shuttle's two assist rockets have ridden the rails to Kennedy Space Center from all over the country.

During the last several weeks, technicians in the Vehicle Assembly Building have been stacking the rockets' segments on their launch platform, which has been newly painted pea-soup green to mask the scars of April's fiery blastoff.

On Thursday, Fred Catalano, manager of launch operations for United Space Boosters Inc. (USBI), the company that puts it all together and checks it out, proudly showed off the finished product for the second Shuttle launch.

But it all started more than three years ago in March 1978. That's when technicians at McDonnell Douglas Astronautics Co.'s plant in Huntington Beach began work on the casing for the lower section of the rocket.

Nine months later workers began putting together the hydraulically powered steering system that fits inside the section. Sunstrand Corp. does the work in Rockford, Ill., home of 1980 presidential candidate John Anderson.

Stacked atop the steering segment of the rocket is the first of four sections containing 554 tons of the solid fuel. These potentially dangerous segments are made in a remote desert area near Brigham City, Utah, by Thiokol Chemical Corp. Construction on the lowest of these motor segments began in January 1980.

Sitting atop the four loaded segments are three more sections: one containing guidance equipment; one that holds the three parachutes that bring the rockets back to Earth gently; and a nose cap.

Although the nose caps top off the whole works and are the last parts to go on, it was the nose cap for the left rocket that first arrived at KSC in March 1978. The nose caps are made by Kaman Corp. of Broomfield, Ky. -- not exactly the aerospace capital of the world.

The various parts are delivered in one bay just inside the door of the VAB, where assembly is completed by USBI. There they wait for the delivery of the mobile launch platform into another bay. That platform was unavailable until after April 12, the date on which the first Space Shuttle rode from it into orbit.

On May 20, the left lower steering segment was placed on the platform, with the right one following two days later.

Stacking began on May 26 when the first fueled section was carefully placed on top of the left steering segment. Workers alternate stacking from the left to right booster to equalize the weight on the launch platform -- 647 tons per rocket.

USBI's Catalano said the two rockets were stacked in half the time it took to stack the set for the Shuttle's first launch.

"We learned an awful lot off of STS-1," he said. For instance, the first set of segments weren't exactly circular because of the way the rockets were picked up and transferred. This time, workers used a four-point lift system, which helped to circularize the segments, he said.

On June 30, the Shuttle's fuel tank will be lowered into place between the rockets. The Orbiter Columbia is scheduled to join its other element on Aug. 28, with liftoff scheduled for 8 a.m. on Sept. 30. (TODAY, 6-5-81)

**June 7:** In December of last year, NASA accepted the first part of an $850 million gift -- a couple of aluminum cans with a back porch.

The label might have read: From Europe with love -- one Spacelab and one Spacelab model.

Ten European nations quite literally have given the United States a laboratory to fly in its Space Shuttle. It is the European Space Agency's major contribution to the Shuttle system.

Although it may sound simple-minded to describe one of the world's most sophisticated orbiting laboratories as a couple of aluminum cans, Spacelab's simplicity is one of its chief attractions.

Spacelab -- not to be confused with Skylab, the orbiting laboratory that burned up in the atmosphere in 1979 -- is, in essence, one of a series of huge sealed cans with an open-air back porch. Within Spacelab, thousands of experiments will ride into space and back, firmly clamped to the payload bay of the Shuttle's airplane-like orbiter.

To conduct the zero-gravity experiments, scientists aboard the Shuttle will crawl through a tunnel from the orbiter's basement to get into the lab, which is large enough for four people to work in at a time. The scientists can work in their shirtsleeves -- no special pressure suits are required.

The experiments in Spacelab will be mounted on a series of racks which slide in and out of the cannisters on tracks. Each experiment can be individually supplied with electricity, heating or cooling and data from an on-board computer. And Spacelab is a can with windows and doors. It can be equipped with an airlock and a variety of overhead windows.

Here at Kennedy Space Center, more than 100 members of a team made up of representatives from the European Space Agency, NASA and McDonnell Douglas Corp. are beginning the work that will culminate in a seven-day Spacelab mission planned for mid-83. Utimately, 20 Europeans will be stationed at KSC. (TODAY, 6-7-81)

**June 8:** A Houston-based group of businessmen has notified the nation's space agency that it intends to launch a five-story -high, privately built rocket this summer from an isolated island off the coast of Texas.

The privately financed Percheron Project plans to develop commercial launch services similar to those now provided exclusively by the National Aeronautics and Space Administration (NASA). A 50-mile suborbital flight by an unmanned rocket comparable in size and power to early versions of the Army's Redstone missile is planned to get the project under way.

Officials of Space Services Inc. of Houston, the company behind the project, have told The Miami Herald that they plan to test-fire a newly designed rocket engine in early July at a private launch site on Matagorda Island, a sparsely populated barrier island 50 miles northeast of Corpus Christi.

If the 30-second ground tests of the engine are successfuly, says the company's president, Houston real-estate developer David Hannah, Jr., the group's first -- and only -- rocket will be fired on a short flight over the Gulf of Mexico later in the month.

By 1983, the company hopes to have more powerful boosters capable of putting communications and earth-surveying satellites into orbit at a price one-sixth of what NASA charges -- a price Hannah believes will generate a booming market for low-cost access to space.

NASA, caught by surprise when it first learned of the plans earlier this year, has not formally evaluated the group's chances of making a successful suborbital shot -- or its long-range hopes of putting heavier payloads in space.

But space agency officials have told The Herald that they are taking the proposal seriously. They say that the launch appears to be within the realm of technical feasibility and that NASA has no clear authority to block it.

NASA General Counsel Neil Hosenball...says the question was never even considered in the Space Act of 1968, which sets forth NASA's responsibilities. (THE MIAMI HERALD, 6-8-81, pp. 1A & 10A)

**June 9:** Rockwell International has encountered no major problems thus far in fabrication of the second Space Shuttle Orbiter -- Vehicle 099 "Challenger" -- and NASA says that "no problems are anticipated" in meeting the planned June 1982 delivery date.

Orbiter 099 was used as the Structural Test Article for the Shuttle development program, and is being modified to a flight configuration. All major elements of the vehicle have been demated and are currently in rework. To date, over 10,000 Thermal Protection System (TPS) insulation tiles have been installed; primary and secondary structural installations are underway.

Final assembly of the vehicle is scheduled to begin in July with the crew module and aft fuselage delivered to Rockwell's Palmdale, California facility.

Challenger is scheduled to make its first flight in December 1982, employing the new lightweight External Tank and orbiting the first Tracking & Data Relay Satellite (TDRS-A).

NASA says that the September 1983 delivery schedule for the third Shuttle Orbiter -- Vehicle 103 "Discovery" -- is "considered achievable but will be tight due to having to utilize work-arounds early in the build cycle." (DEFENSE DAILY, 6-9-81, p. 214, Vol. 116, No. 27)

**June 10:** Two Titusville fire fighters died of burns this week when a thunderstorm-fanned brushfire trapped the men on a bulldozer on Kennedy Space Center property, officials said Tuesday.

Beau Sauselein, 32, died Tuesday at Shands Teaching Hospital in Gainesville with third-degree burns over much of his body. He was hospitalized Monday in critical condition, officials said.

Scott Maness, also 32, was taken to the Jess Parrish Hospital in Titusville, where he died Monday afternoon, said National Aeronautics and Space Administration (NASA) spokesman Mark Hess.

Both fire fighters were employees of the U.S. Fish and Wildlife Service. (THE MIAMI HERALD, 6-10-81, p. 3C)

<> Attendance to the Visitors Center at NASA's Kennedy Space Center continued at a record-setting pace through May, making the first five months of 1981 the busiest in the history of the attraction.

More than 143,700 people came to the Visitors Center in May breaking all previous attendance marks recorded for that month since the attraction opened in 1966. Of that total, nearly 115,000 also took the guided bus tour of KSC facilities used to assemble, checkout and launch the Space Shuttle. The total for May was 38 percent higher than for the same month in 1980.

New attendance marks have been set for each of the first five months of 1981. For the year, attendance is running just over 26 percent higher than for the same period in 1980. Visitor Center officials are optimistic that if the trend continues, the VIC will record its first 2 million visitor year.

Up to now, the VIC's banner year was 1972, the same year NASA launched its final two Apollo lunar landing missions, when nearly 1.4 million people were attracted to the Visitors Center.

The current surge in visitor attendance is being attributed to a renewed public interest in space, largely due to the success of the first Space Shuttle flight, launched from KSC in April.

The Visitors Center, which will celebrate its 15th birthday in July, has attracted more than 20 million visitors since it opened. (KSC RELEASE NO. 161-81, 6-10-81)

**June 11:** Kennedy Space Center has awarded a $1 million contract to Fluid Energy Controls Inc. (Orlando) to provide 22 hypergol and pneumatic panels for Space Shuttle facilities at KSC and Vandenberg AFB. (DEFENSE DAILY, 6-1-81, p. 232, Vol. 116, No. 29)

<> NASA officials say spaceflight projects should remain a function of the government and scoff at plans by a group of Texas businessmen to launch satellites for profit.

Space Services Inc., a new Houston-based company, says it can launch satellites for a fraction of NASA's price, and hopes to become the first private U.S. business in the market by late 1982.

"Are they aware that I've got a staff of several thousand people working in a program that launched 10 flights last year?" said Peter Eaton, NASA's program director for Delta Launch Vehicles.

But Gary Hudson, whose GCH Inc. has spent the last six months building the first rocket for Space Services, said Eaton's problem is that he is part of the government bureaucracy.

"All bureaucrats require staffs of several thousand people," he said. "The Thor rockets were launched (by the space agency in the late 1950s) by eight people from a transporter. Why does Eaton need 600 to 1,000 people now to do the same thing?"

David Small, space specialist for the State Department's legal office, said the government has not even decided yet whether it will approve the venture. "I'm just not ready to make a formal judgment," Small said.

Eaton asked, "If they launch their rocket and it comes down in the middle of downtown wherever, who's going to pay the damages?"

Space Services President David Hannah said the company carries $25 million in flight insurance.

"The cutting edge of all this is whether the government will say, 'The government's got to do this kind of work,'" he said. "If it does, then I think we really have given ourselves over to a socialistic form of government."

A sub-orbital test flight of the 53-foot-long rocket is set for next month, Chafer said, with a splashdown in the Gulf of Mexico. "If this is successful I think we will have established our credibility," said Hannah. The rocket will be launched from Matagorda Island on the Texas coast.

Hudson said Space Services will put a satellite such as those used in weather observation into a 100-mile-high orbit for about $2 million.

He predicted a $5 million pricetag for sending communications satellites into geosynchronous orbit, in which the payload turns with the Earth and constantly remains about 23,000 miles above the same point, appearing stationary to people on the ground.

NASA officials said it costs about $22 million for the lower orbit and $25 million for the higher one using Delta rockets carrying 2,400 pound payloads comparable to those foreseen by Space Services.

Eaton laughed at Hudson's cost estimates and said the entrepreneurs probably do not realize how complicated spaceflight is.

Chafer said it didn't seem that complicated to him. "It's a fairly basic technology. It doesn't appear to us to be all that difficult, although in the long term there will no doubt be some setbacks." (TODAY, 6-11-81)

**June 11:** An accident battered at least 15 thermal protection tiles on the space shuttle Columbia's left wing Thursday and may have damaged the wing itself.

The accident hit at 5:20 a.m. while technicians were testing the hydraulic system that raises and lowers the shuttle elevons, or wind edges. The left edge struck an access platform, damaging 15 to 18 black tiles and inflicting possible structural damage to the shuttle.

The accident is not expected to delay the shuttle's second launch, now scheduled for September 30. Before the accident, Rockwell International planned to replace about 300 tiles and strengthen 500 more. The spaceplane is scheduled to roll to its launch pad in late August.

In another Thursday mishap, hydraulic fluid was found leaking from a line that usually contains gaseous nitrogen. The problem apparently was caused by faulty ground support equipment, not flight hardware, a NASA spokesman said. (SENTINEL STAR, 6-12-81)

**June 12:** A weightless paper clip floating around in a power supply box caused one of the minor problems that arose during the flight of the Space Shuttle in April, officials said Thursday.

The paper clip, apparently overlooked before the launch, caused a short circuit in the power box. A backup unit provided the necessary power, however.

The short was one of 52 minor problems that have been examined in two months of evaluation of the April 12-14 mission.

Joseph E. Mechelay, manager of the mission evaluation, said Thursday that all the problems were so minor the Columbia could be ready for its second launch from Kennedy Space Center long before the scheduled September 30 liftoff. . .

Another problem was that areas on either side of the rear of the vehicle sustained higher temperatures than expected, Mechelay said.

Engineers still do not understand what caused the problem, he said, but they now plan to put more insulation tiles in the affected area. (TODAY, 6-12-81)

**June 14:** Sen. William Proxmire (D-Wis.) charged Sunday that NASA is not charging commercial and foreign users of the Space Shuttle enough money to pay for the actual operating costs of the vehicle.

NASA, in fact, to attract customers for the Shuttle, promised six years ago to set a set-fee of $18 million in FY '75 dollars for a full Shuttle payload for the first three years of Shuttle operations. (That $18 million, incidentally, is estimated at about $35 million in FY '82 dollars.)

However, Proxmire charged that even the $18 million figure was based on improper accounting, resulting in a "phony fee schedule" and "a windfall" for foreign and commercial users of the Shuttle.

The error, he said, is that NASA for contract purposes has estimated that each Shuttle Orbiter can make 500 flights, while the procurement contract with Rockwell calls for a life of only 100 flights.

While Acting NASA Administrator Lovelace told Proxmire earlier that the Orbiter may well be able to fly 500 flights, Proxmire noted that at a rate of 14 flights per year, double that projected through 1985, the Orbiter would have to fly for 36 years to meet the 500-flight goal, which he said is "absurd."

The result of this, he said, is that depreciation costs account for only $1 million of the $18 million user fee. Using 100 instead of 500 flights as the baseline, the depreciation cost would total $5 billion, boosting the user fee to $22 million, the senator said. He called the 500 flight figure "remarkably optimistic."

Proxmire called on NASA to publicly state that it must subsidize Shuttle operations to get commercial and foreign users if that is the case.

He said that NASA "should not pretend that the Shuttle is self-sufficient and then rig the user fee charges so that the taxpayer in reality foots the bill." (DEFENSE DAILY, 6-16-81, p. 256, Vol. 116, No. 32)

**June 16:** The Columbia's crippled wing will be patched with pieces from a dummy space shuttle, NASA officials said Tuesday, but the September 30 launch is still on.

The cannibalized parts, stripped from the Enterprise, will fill a five-foot gap on the Shuttle's left wing where an accident last week damaged 18 thermal protection tiles and tore and bent the wing's trailing edge. The wing edges, called elevons, enable the Shuttle to maneuver aerodynamically during descent and landing.

The Columbia's wing, being raised hydraulically during a test, struck a platform inside the shuttle hangar.

The Enterprise is a dummy spaceship equipped with wooden rocket engines. Originally designed for space travel, it was later adapted as a prototype and flew a series of approach and landing tests in 1977 at Edwards Air Force Base in California. The dummy spaceship also served as a mannequin for fitting the orbiter with its flight hardware and ground-support equipment.

The Enterprise is stored in a hangar at Rockwell International's Palmdale, California plant. NASA has no plans to convert the prototype into a working shuttle, but it will be used for measurements at Vandenberg Air Force Base in California, where the Air Force is building a west coast launch facility for the shuttle.

The mock spaceplane was named after the star ship Enterprise because of heavy lobbying by fans of the Star Trek television series. (SENTINEL STAR, 6-17-81, p. 6C)

**June 17:** The two men nominated by President Reagan to head the space agency said Wednesday that a manned orbiting station should be America's next major space goal.

"We should start thinking soon about a space station, because that will open up all kinds of potential applications -- scientific, research, practical uses of space," said James Montgomery Beggs, nominated to be administrator of NASA.

"The space station is the next natural step, the establishment of a permanent presence in space," added Hans Mark, nominated as deputy administrator.

They testified at a confirmation hearing before the Senate Commerce, Science and Transportation Committee. Sen. Harrison Schmitt, R-N.M., who chaired the session, called them an "excellent team" and said he was certain the committee would send their nominations to the full Senate. (TODAY, 6-18-81, p. 1A)

**June 18:** When the second Shuttle leaves Kennedy Space Center this fall for its five-day mission, it will have a $100 million arm on it and half a dozen photographic and electronic eyes to look down on the Earth and its oceans.

"From our parochial point of view, it's the time when the Shuttle finally gets to do what it's supposed to do," said John Neilon, the manager of KSC's cargo projects office, "and that's to fly experiments and cargo."

Neilon and other NASA officials were showing off what will fly on the second Shuttle at a grand cargo premiere at KSC Thursday.

Most of that cargo will be scientific instruments. The Columbia's payload bay, which was only about 10 percent full for the first flight, will be almost 40 percent full for the second flight.

To the rear of the Columbia's 60-foot-long hold will be a bundle of instruments that will tell scientists how the Shuttle is performing. Toward the front of the cargo bay will be another, but larger, package of instruments that will tell scientists something about the Earth below.

Edwin C. Johnson, a KSC cargo official, said that the rear package's instruments are designed to verify what computer models and wind tunnel tests have been telling Engineers about the Shuttle. "They're designed to prove that the predicitions were correct in the first place," Johnson said. The instruments will measure noise, heat, vibration and possible contamination in the payload bay.

A similar package flew on the first flight of the Shuttle.

The second group of instruments will be mounted on a large aluminum platform provided by the European Space Agency. Among the experiments will be:

* A radar camera that will provide two-dimensional photos of the Earth's surface in hopes of identifying valuable minerals, coal and oil. Using a 33-foot-long antenna, scientists hope to identify geological faults, folds and stratification that pinpoint hidden natural resources.

* Two television cameras that will tell scientists whether areas of the Earth are covered with water, vegetation, bare ground, or snow. Presently, scientists wanting to estimate the amount of a certain crop growing on the Earth's surface have to sift through the total recorded satellite images, including rocks and bare hills. If this experiment is successful, images of vegetation could be separated from other features.

* An air pollution monitor that will measure the amount of carbon monoxide in the lower atmosphere. With information gathered by this experiment, scientists will explore the possibility of using satellites to monitor air quality.

* An ocean color experiment. The experiment will map the distribution of algae in the Atlantic and Pacific Oceans. Where there are high concentrations of algae, fish schools tend to congregate.

* An infrared sensor that will be used to identify rock types.

Also aboard the flight of the Columbia will be a 50-foot-long arm that will be used on later Shuttle flights to release and catch satellites. The robot arm cost the Canadian government $100 million to develop and build. It is Canada's contribution to the Shuttle program. NASA is buying three more of the arms from Canada for $65 million.

The arm has a shoulder, elbow and wrist like any other arm, but the hand is another matter.

It is called an end effector -- "that's a bit of robotics jargon for the business end of the arm," said Bruce Aikenhead of the National Research Council of Canada.

Aikenhead said that although the arm weighs less than 1,000 pounds and cannot lift its own weight on Earth, once it's free of the Earth's gravity it can handle something the size and weight of a Greyhound bus.

Astronauts Joe Engle and Richard Truly will sit at a control board in the rear of the Columbia's cockpit and exercise all the arm's joints during the second flight, scheduled now for September 30. Then they will practice snagging what's called a grapple fixture. But the arm will not actually pick anything up until the (third) flight. (TODAY, 6-19-81)

**June 19:** An unannounced test change was largely to blame for the March 19 accident that killed two space shuttle mechanics, according to a NASA board of inquiry.

The 400-page report, released Friday to the White House and members of Congress, outlines a total communications breakdown between officials controlling the countdown test and the men who were supervising launch pad operations 3 1/2 miles away.

According to the report, pad officials were using a different set of instructions and were never briefed on the change that had been made three days earlier.

The test "deviation" extended the usual time for flushing nitrogen from an aft engine compartment, so technicians could determine whether nitrogen gas was leaking into the crew compartment.

Unaware of the test change, pad officials re-opened many areas of the shuttle for work, including the nitrogen-filled engine compartment. The gas overwhelmed five Rockwell International mechanics as they entered the compartment. The two victims were identified as John Bjornstad, 51, of Titusville, and Forrest Cole, 50, of Merritt Island.

Bjornstad never regained consciousness after collapsing and was pronounced dead at a hospital a short time after the accident. Cole died on April 4 at Shands Teaching Hospital in Gainesville.

Widows of Bjornstad and Cole are seeking separate claims against NASA totaling $43 million, for the wrongful deaths of their husbands. NASA has six months to deny, ignore or settle the claims before they are filed in federal court.

The test procedure "did not contain adequate steps for clearing the vehicle or pad for hazardous operations and for...reopening the vehicle and pad for resuption of normal work," the investigative board said in a report.

The board said the lack of a warning sign was also a significant factor in the accident, saying it "negligently permitted" the crew to return to the compartment before the toxic gas had been cleared.

"Since the firing room crew knew that GN2 (gaseous nitrogen) was still flowing, the public address system announcement that the pad was open for normal work was in error," according to the report.

No disciplinary action has been taken against anyone involved in the accident, said spokesmen for Rockwell International and the space agency. (SENTINEL STAR, 6-20-81)

**June 22:** For 25 years the United States has been running the "only game in town" when it came to placing communications satellites in orbit for western nations. The cost and complexity of developing launch vehicles with the power and reliability to put sizable payloads in orbit kept other countries from duplicating our space achievements.

But that era is now over. It was ended Friday with the successful orbiting of two satellites by a three-stage Ariane rocket, which was fired from a base in South America.

The $1.6 billion Ariane program was created and financed by a 10-nation consortium led by France and West Germany. In a way, the opening of this new avenue to space may be bad news for our own program, because it means our "toll charge" may have to be lowered if we want to continue getting most of the traffic.

In the long run, however, we think competition for space developments can only benefit the people of all nations. Our industrial and economic system was built on free enterprise and competition, so we shouldn't bemoan the fact that the Europeans have decided to challenge American technology in the new field of commercial exploitation of space.

"This means space is no longer the exclusive preserve of a few powerful nations, but now belongs to all of humanity," commented one elated official of the European Space Agency after Friday's successful launch.

Even if a bit overzealous, the statement makes a point. Although we don't see cause to be upset about our losing a monopoly on satellite launching services, we do think it would be bad for the United States to allow its leadership in this field to slip away. We clearly have leadership now, as was demonstrated by the highly successful first flight of the Space Shuttle in April.

The Soviet Union, our most formidable competitor, does not have the capability to take up -- and bring down -- payloads of the size that can be carried in the Shuttle's rather voluminous cargo bay. The use we make of this new tool -- which many view as the workhorse of space -- will determine whether the United States retains and capitalizes on its lead in space. (TODAY, 6-22-81)

**June 23:** "Increasing competition to U.S. operations in space can...be expected from the European Economic Community which, through the European Space Agency (ESA), is developing its own space transportation system, the expendable Ariane...Ariane, designed to compete with the U.S. Shuttle and already drawing customers from it, will be

able to launch Atlas-class payloads to geosynchronous transfer orbit (1700 kg) while follow-on versions in development or planning have capabilities...up to 2420 kg. Even a fully reusable crew and supply transport vehicle, the Hermes, is being studied for a two-stage version of Ariane V" -- Chairman Don Fuqua (D-Fla.), of the House Science & Technology Committee, June 23, 1981. (DEFENSE DAILY, 6-26-81, p. 320, Vol. 116, No. 40)

**June 24:** Computer Sciences Corporation's Applied Technology Division has received a one-year, $45.5 million extension from Kennedy Space Center for continued operation of the Space Shuttle launch processing computers and the center's computer complex, and other services. The extension brings the value of the CSC contract to $155.5 million. (DEFENSE DAILY, 6-24-81, p. 303, Vol. 116, No. 38)

<> No one will be disciplined or censured because of the March 19 accident at Pad 39A that claimed two lives, Kennedy Space Center director Richard Smith said Wednesday.

"I don't see that it was any one person's fault," Smith said in an interview.

"The system broke down at several places, and I don't see anything that says you ought to single out a single operation or organization and take disciplinary action."

Smith also said all the measures recommended by an investigative board will be either put into effect or studied.

"We put most of these findings into effect before the launch of STS-1 (April 12)," he said.

Smith said procedures have tightened and the chain of command has been clarified.

The most significant change, Smith said, was the way access signs have been modified.

Although there was an "access control sign" barring entrance to the hazardous area that Bjornstad and Cole entered, there should have been a "safety hazard sign" -- indicating a more stringently controlled and more hazardous area.

Smith said the second most significant change has been "tightening-up of procedures -- not major changes in the procedures, because the procedures were already there."

Those procedural changes involve making sure everybody knows about any work or tests added to the schedule.

The investigative panel determined the addition of a "tack-on" test to the launch dress rehearsal was the single factor that most contributed to the accident. The test, one of 500 such deviations, was added on several days before the accident.

The tack-on test, which involved prolonging the flow of nitrogen in the Orbiter, was not adequately discussed in pretest briefings, was not included on the main schedule or on Rockwell's work schedule and was virtually ignored on the day of the countdown as workers began pressing test conductors to open the pad back up for work, the report said.

Another factor in the accident was scheduling what NASA calls side work at the same time as hazardous operations. The board found the practice was used in an effort to stay on schedule.

The panel recommended "scheduling of side work during hazardous operations should be prohibited as a matter of practice."

But Smith didn't promise any such prohibition for the second Shuttle launch scheduled for late September.

Such side work will be scheduled during hazardous operations "at times, but it will undergo much more careful scrutiny," he said.

The problem with the chain of command has also be attended to, Smith said. (TODAY, 6-25-81)

**June 26** Symetrics Industries, Inc., of 557 N. Harbor City Boulevard, Melbourne, has been awarded a contract to supply NASA's Kennedy Space Center with 20 multi-circuit Operational Intercommunications Systems (OIS).

The value of the fixed-price contract is $64,251, until March 20, 1982. The contract is one set aside for award to a small business firm.

The communications systems will be used in the control rooms of the Complex 39 Launch Control Center and will be used primarily to provide a means for test directors, engineers and technicians to communicate during Space Shuttle tests and launches. Each control unit will permit their operators to monitor up to eight channels simultaneously. (KSC RELEASE No. 172-81, 6-26-81)

<> Around-the-clock launch preparations for the space shuttle's second flight, still scheduled for September 30, are going smoothly. But there are still major problems with fuel tank icing and excessive blastoff stress.

Ice formation on the nose of the huge, blimp-shaped tank caused damage to Columbia's skin on the maiden launch, and engine firing pressure on the spaceship was four times greater than anticipated, Dr. Robert Gray, manager of the shuttle projects, said Friday.

The stress problem could be serious on the second flight because the shuttle will be carrying a payload of sensitive Earth-scanning equipment. (SENTINEL STAR, 6-27-81, pp. 1C & 2C)

**June 27:** Two local firms have recently been awarded contracts by NASA at the Kennedy Space Center.

Management Services Inc., with offices at the space center, has won an extension to its contract under which it performs precision cleaning and chemical analysis services. The $2.5 million extension brings the total value of NASA's contract with Management Services Inc. to $13.1 million. The contract runs through February 28, 1982.

New World Construction Co., of Titusville, has won a $178,885 contract to build a repair shop for Space Shuttle main engines. The shop will be located inside the Vehicle Assembly Building at KSC.

NASA also announced that the Applied Technology Division of Computer Sciences Corporation has won an extension to its KSC contract. The company provides technical support services ranging from Shuttle launch computer operation to radio frequency control and analysis. The extension is for $45.5 million, bringing the total worth of CSC's contract to $155.5 million. The extension runs through May 31, 1982. CSC is located in Falls Church, Virginia. (TODAY, 6-27-81)

<> Imagine the glistening white Shuttle, basking in the light of a September moon, with four day-glo orange racing stripes painted down its side.

Yes, some bright orange stripes might be painted onto the Shuttle fuel tank to help observers watch the re-entry and breakup of the tank over the Indian Ocean.

And no, Shuttle astronauts Richard Truly and Joe Engle don't plan to hang a pair of foam dice on the Shuttle's rear view mirror.

According to a spokeswoman for Marshall Space Flight Center in Alabama, engineers at Johnson Space Flight Center in Texas assigned external tank experts at Marshall to study the possibility of painting the tank to make it a little easier to see.

Apparently, tank experts are less than enthusiastic about the idea. In fact, they declined to talk about it other than to say the idea was being considered.

But Kennedy Space Center has the paint and is ready to put it on.

"We're talking on the external tank about putting four day-glo orange stripes down its length," said Bob Gray, head of Kennedy Space Center's Shuttle Projects Office. "I don't know that you'd call them stripes being how they're 10 feet wide and 15 feet long."

There would be four stripes at different elevations on the tank, Gray said. That would make the tank show up better in photographs to be snapped from aboard a ship stationed in the Indian Ocean.

How about a pair of fender skirts for the crawler transporter? (TODAY, 6-27-81)

**June 29:** The Senate Friday by voice vote confirmed the nomination of James Beggs to be administrator of NASA. The nomination of Hans Mark to be deputy administrator was sent to the floor by the Commerce Committee after that of Beggs because of a minor paperwork problem, and therefore didn't get on the calendar. Speedy confirmation is expected when the Senate reconvenes July 8. Beggs, 55, has been executive vice president in charge of Aerospace Operations for General Dynamics since 1974.

Meanwhile, the nomination of George A. Keyworth of the Los Alamos National Laboratory to be President Reagan's science adviser has not yet been submitted to the Commerce Committee, which will hold confirmation hearings shortly after it gets the nomination. (DEFENSE DAILY, 6-29-81, p. 327, Vol. 116, No. 41)

<> Multi-instrument array keyed toward future oil and mineral exploration from space and improvement of overall U.S. remote sensing capability is scheduled for loading in the cargo bay of the orbiter Columbia this week as the first formal payload of the space shuttle program.

Designated OSTA 1, for the first Office of Space and Terrestrial Applications shuttle payload, the instrument complement includes five sensors mounted on a British Aerospace Spacelab engineering pallet and two smaller systems to be carried in Columbia's cabin with astronauts USAF Col. Joe H. Engle and Navy Capt. Richard H. Truly, during the second shuttle mission. Launch is targeted for September 30.

OSTA 1 has spent about two years in checkout and integration here, a processing flow that nears an end June 29, as the 5,604-lb. system is scheduled to be hoisted over Columbia's open payload bay doors and bolted to the cargo bay. The OSTA 1 schedule called for lift out of its cargo integration

and test equipment checkout stand in the operations and checkout building and it was placed in the payload canister on June 24, in preparation for the scheduled transfer to the Orbiter Processing Facility on June 29.

The move is being made about two weeks earlier than originally planned to insure that any electrical or structural interface problems between the shuttle's first payload and the orbiter can be resolved without affecting the September 30 launch target, James Ragusa, Kennedy's site support manager for the OSTA 1 payload, said. Interface problems should be minimal because of the lengthy OSTA 1 checkout here and the time the payload spent in the cargo integration and test equipment (CITE) stand, a pseudo orbiter electrically and physically.

OSTA 1 completed a major electrical activation in the CITE stand April 27-29, according to Ragusa. (AVIATION WEEK & SPACE TECHNOLOGY, 6-29-81, p. 54, Vol. 114, No. 26)

<> Specialty Maintenance and Construction, Inc. of Lakeland, Florida, has won a contract with the space center to update lighting and air conditioning systems in a vital technical building (the Central Instrumentation Facility) here.

The fixed price contract with the firm is for a total of $1,097,624, and is the result of a set-aside for small business firms. (KSC RELEASE No. 171-81, 6-29-81)

**June 30:** The second flight of the Space Shuttle Orbiter Columbia, scheduled for launch September 30 at Kennedy Space Center, has been extended one day to five days and six hours because of the near-perfect flight of the first mission, and, in particular, the lower-than-expected consumption of oxygen and hydrogen by the Columbia's fuel cell electric generators in the maiden flight.

The extra day will give astronauts Joe Engle and Richard Truly more time to test the Remote Manipulator System, which has been installed in the Columbia's payload bay. It will also provide an extra day for operation of the Shuttle's first payload -- the OSTA 1 -- a package of seven primarily Earth resources experiments, most of which will be carried in the payload bay aboard an engineering model of the Spacelab pallet. Installation of the instruments was scheduled for yesterday.

The experiments are the Shuttle Imaging Radar, the Ocean Color Experiment, the Shuttle Multi-Spectral Infrared Radiometer, Measurement of the Air Pollution from Satellites, Nighttime and Daylight Optical Survey of Thunderstorm Lightning, Feature Identification and Location Experiment (an advanced technology experiment involving location of surface features and clouds) and the Heflex Bioengineering Test (a life science experiment involving sunflower seeds).

In addition to OSTA 1, Columbia will carry the Induced Environment Contamination Monitor (IECM), a system development by Marshall Space Flight Center comprised of ten instruments to check for contaminants in and around the cargo bay which might adversely affect experiments. The monitor will look for outgassing from materials within the Shuttle, along with gases from the reaction jets which control the vehicle in orbit.

NASA, in a briefing Friday, said that the only problem of any significance resulting from the maiden Shuttle flight was a stronger-than-expected overpressure that occurred when the two Solid Rocket Boosters were ignited on the launch pad.

It said the overpressure subjected parts of the Columbia to stresses close to the maximum pressure they were designed to withstand. NASA is looking at several launch pad modifications to reduce the pressure if it is determined that the overpressure is a possible hazard. Modifications, if needed, will not delay the September 30 launch date, the agency said.

Scheduled today at the Vehicle Assembly Building at KSC is the bolting of the External Fuel Tank to Columbia's Solid Rocket Boosters.

The Columbia is scheduled to be moved from the Orbiter Processing Facility to the VAB on August 4 for mating with the ET and SRBs. The mated vehicle is scheduled to move to the launch pad August 26. (DEFENSE DAILY, 6-30-81, p. 332, Vol. 116, No. 42)

<> Rep. Bill Nelson (D-Fla.), a member of the House Space Subcommittee, has suggested that President Reagan set forth a national space policy that includes the goal of establishing a Space Operations Center, a permanently manned Space Station, in low Earth orbit by 1989. (DEFENSE DAILY, 6-30-81, p. 332, Vol. 116, No. 42)

<> The space shuttle's 97-foot blimp-shaped fuel tank began a slow rendezvous Monday evening with two 115-foot rocket boosters.

Crews worked through the night to connect the tank and the rockets, a launch assembly that is to be joined with the space shuttle Columbia on August 4.

A giant crane began moving the tank from the west side of the Vehicle Assembly Building to the east side to meet the pair of rockets at 5:30 p.m.

NASA spokesmen, still hoping to see Columbia's second launch go on schedule September 30, said Monday afternoon that the tank and rocket mating began several hours earlier than initially planned. Work was expected to end sometime this morning.

The dazzling white tank forms the backbone of Columbia's "launch configuration." Each booster is attached to four points on either side of the tank. The spaceship grips the tank with three connections.

Each booster kicks in 2.6 million pounds of thrust to help the main engines lift Columbia from the pad and into orbit. The boosters, spent in two minutes, are blown free 28 miles above the Atlantic Ocean.

The tank, filled with liquid oxygen and hydrogen, remains attached to the shuttle for 6 1/2 more minutes, fueling the spaceplane's three engines. It is jettisoned 70 miles above Earth and tumbles into the Indian Ocean.

There are plans to paint Day-Glo orange strips on the external tank for the second mission so a tracking ship can get better pictures of its descent, a NASA spokesman said.

Most of the tank is supposed to disintegrate before it strikes the water. The reusable boosters are towed into Port Canaveral.

The two boosters used for the first mission in April are being refurbished. (SENTINEL STAR, 6-30-81, p. 4C)

<> Two thirds of the second Space Shuttle is bolted together and ready to go.

The candle-shaped rockets are sitting on the movable launch pad, and Monday night the fuel tank was hoisted from its preparation area high into the roof beams of the Vehicle Assembly Building. Then it was lowered back down between the two assist rockets and "was mated hard down" by 7 a.m. Tuesday.

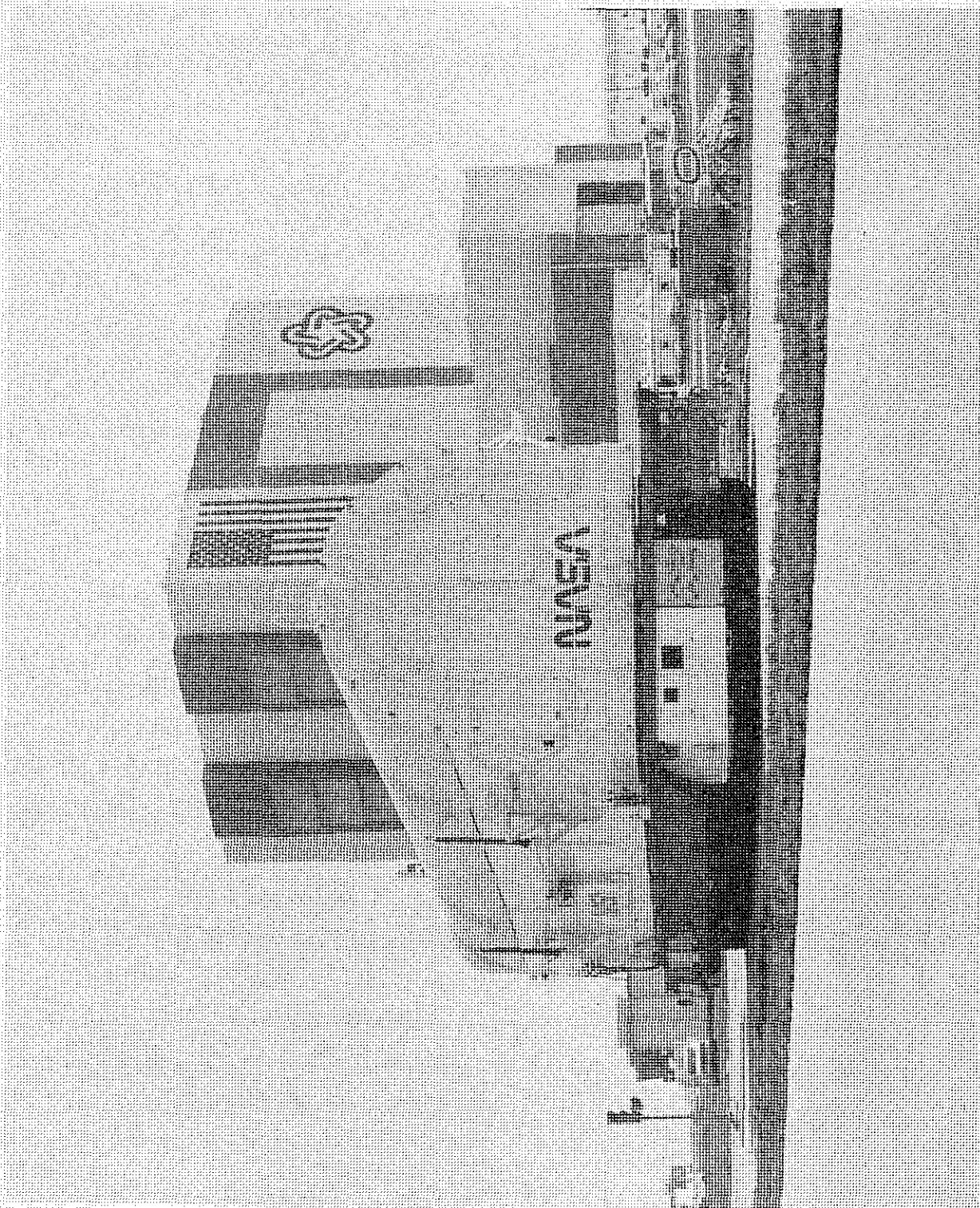
"It took less than half the time it did for STS-1 (the first Shuttle mission)," said Dick Jones, supervisor for the operation for Martin Marietta Aerospace, the company responsible for the Shuttle's fuel tank.

Jones said the operation went more smoothly this time primarily because many of the modifications that had to be made on the first tank were made in Michoud, Louisiana, where the tanks are manufactured.

The tank has already been loaded once with liquid oxygen and hydrogen at the National Space Technology Laboratories in Bay St. Louis, Mississippi. (TODAY, 7-1-81)

**June 1981:** Honeywell Information Systems, Inc., McLean, Virginia, has been awarded two contracts for Space Shuttle Launch Processing System elements by the Kennedy Space Center, Florida. One contract, in the amount of $19,422,731 provides for computers and software support services at Vandenberg Air Force Base, California; the other contract, in the amount of $10,750,331 provides parallel services for Kennedy Space Center, Florida. The Launch Processing System controls and performs much of the Space Shuttle vehicle checkout automatically while the vehicle components are being prepared for launch...The Kennedy Space Center contract performance period extends from Sept. 1, 1981

through Sept. 30, 1982. Annual options may be exercised thereafter which would extend the contract through Sept. 30 and bring the potential aggregate value of the contract to $62,286,698. (NASA ACTIVITIES, 6-81, p. 18, Vol. 12, No. 6)



The payload canister approaches the Vehicle Assembly Building on July 1, 1981.

**July 1:** The engineering model Spacelab pallet that carries five of the seven experiments for the OSTA-1 (Office of Space & Terrestrial Applications-1) scientific payload, was loaded into the cargo bay of the Orbiter Columbia July 1 at the Orbiter Processing Facility at Kennedy Space Center. OSTA-1 will be the first payload carried into space by the Shuttle. (DEFENSE DAILY, 7-6-81, p. 21, Vol. 117, No. 3)

**July 3:** Alan Lovelace, acting administrator of NASA since January when Robert Frosch resigned, will leave the agency July 11 for private industry, NASA headquarters in Washington announced Thursday.

Lovelace will join General Dynamics Corporation in St. Louis as corporate vice president for science and engineering. He will direct and coordinate the company's engineering, research, advanced product and program development, a NASA spokesman said.

In December, Lovelace announced he intended to retire from NASA but agreed to stay when then-administrator Frosch decided to leave the agency for a job as president of American Association of Engineering Societies.

NASA's new chief, James Beggs, 55, left a post as vice president of General Dynamics to come to NASA. The Senate confirmed his nomination last week and he starts work Tuesday.

President Reagan recently awarded Lovelace the Presidential Citizen's Medal for his role in the Space Shuttle's development. (TODAY, 7-3-81)

**July 6:** A pressure pulse four times stronger than predicted generated heavy loads on the space shuttle orbiter when the two solid rocket boosters were ignited for the first launch April 12. National Aeronautics and Space Administration has been attempting since the launch to determine if the overpressure was random or a problem that will require a hardware fix.

Analytical work is under way here and at Marshall Space Flight Center to find out why the pulse was not deflected away from the shuttle system and why it reached a force of 2.0 psi. when the prediction was 0.5 psi. A load of 2.0 psi. could damage structures inside the payload bay, particularly attach points for payloads and systems, according to Robert H. Gray, manager of the Kennedy Shuttle Projects Office.

Gray said the pressure wave surrounded the entire orbiter vehicle. No damage resulted, but loading on the aft heat shield approached design limits, elevons were moved about 6 inches and the crew compartment was subjected to a 3g load that lasted a few milliseconds, according to Gray.

There is no general agreement within NASA that launch measurements are completely accurate and Marshall is conducting tests to verify numbers and data.

Several changes are being considered on the launch pad to insure deflection of the pressure pulse if a fix is required. Among them:

* Installing steel deflector barriers on the launch platform.

* Closing exhaust holes during the ignition phase with steel cables arranged like a grid and covered with a burnable "soft" metal.

* Incorporating a water barrier deflecting system.

Exhaust and flame should be carried away along the concrete deflector tunnels that are part of the launch complex. If it is concluded that the existing system is not adequate, a decision on how to proceed will be made within several weeks, Gray said. He called the overpressure incident the most serious problem NASA has in preparing for the second shuttle launch, but that it will not affect the planned September 30 launch date because any required fix can be completed by then. (AVIATION WEEK & SPACE TECHNOLOGY, 7-6-81, p. 21, Vol. 115, No. 1)

<> On April 12, NASA's newest flying machine rose proudly from its pad, accompanied by the click, whir and hum of hundreds of government cameras recording the event.

But just eight days later, as Kennedy Space Center photographers were busily developing the thousands of pictures they took of the Space Shuttle's liftoff and landing, President Reagan issued a moratorium banning government agencies from publishing new material or making new movies.

"I think that the president's order is a good thing," said Charles Hollinshead, KSC's director of public affairs. "It just hit us at a bad time."

The president was not singling out NASA. The ban applies to 20 government agencies.

"The federal government is spending too much money on public relations, publicity and advertising," Reagan said. "Much of this waste consists of unnecessary and expensive films, magazines and pamphlets."

Like the films, magazines and pamphlets published on NASA's Apollo missions?

"They do put out a lot of stuff," said a spokesman for the president's Office of Management and Budget, which is assigned to make sure the moratorium is heeded. "It's the sort of slick, high quality stuff that attracts a lot of attention.

"But I wouldn't say NASA is notable in its expenditures in relation to the other agencies," said the official, who asked not be named.

How is NASA reacting to the restrictions?

"So far it hasn't caused us a lot of problems," said KSC's Hollinshead.

"We're not singing the blues," said Brian Duff, director of public affairs in NASA's Washington office. "Austerity has taught us how to be lean." (TODAY, 7-6-81, p. 1A)

<> President Reagan's national secuity adviser, Richard Allen, has initiated a federal interagency review on uses of the space shuttle, stimulated by the successful first flight of the vehicle. The review will be managed by the White House Office of Science and Technology Policy and headed by its director, George A. Keyworth, President Reagan's science adviser. Space industrialization and priorities between military and civil uses of the space shuttle will be addressed both in the context of constrained budgets and revitalizing U.S. technical capability.

As the White House assessment was being launched, NASA and USAF were holding their own meetings at Systems Command Headquarters at Andrews AFB, Maryland. Most important early result of the session was a decision to slip the initial shuttle operational capability at Vandenberg AFB, California, from mid-1984 into 1985. (AVIATION WEEK & SPACE TECHNOLOGY, 7-6-81, p. 15, Vol. 115, No. 1)

<> NASA's John F. Kennedy Space Center has awarded the firm of Frank A. Kennedy, of Cape Canaveral, Florida, a contract to provide the Spaceport with a Vapor Detection Calibration Capability in a high-pressure gas cleaning area.

The fixed-price contract carries a value of $88,754, and is to be completed 150 calender days after the contract was awarded on June 30, 1981. The contract is one set aside for award to a small business firm.

The contract calls for modification of a high-pressure gas cleaning area located at Launch Complex 39. (KSC RELEASE No. 174-81, 7-6-81)

**July 8:** The Denver (Colorado) Aerospace Division of Martin Marietta Aerospace, Inc. has been awarded a supplemental agreement to an existing contract with NASA's Kennedy Space Center. The award provides for communications security devices to be incorporated into the Space Shuttle checkout and launch support facilities at the space center.

The value of the cost plus fee agreement is $5,360,676, and brings the total value of the Martin Marietta contract at KSC to $101,781,432. The overall contract covers the period from February 4, 1980, through January 1, 1982.

The contract supplement calls for the installation of encoding and decoding devices in the Checkout, Control, and Monitor Subsystems of the Launch Processing System used to checkout and launch the Space Shuttle. The new equipment, designed to enhance security for sensitive communications, will be installed in the Launch Processing System in the Launch Control Center firing rooms. (KSC RELEASE No. 176-81, 7-8-81)

**July 10:** As part of its continuing evaluation of projected costs of the Space Shuttle, NASA informed the White House Office of Management & Budget this spring of "threats" to the program that could increase its costs by $300 million to $500 million in FY '83 over what the agency had earlier estimated.

A top agency official told Defense Daily yesterday that current estimates continue to show the possibility of an increase of that magnitude.

The projected FY '83 budget for Space Transportation Systems had been $2.8 billion, which has been boosted by inflation to about $3 billion. The increase, if it materializes, would boost the FY '83 STS budget to $3.3-$3.5 billion.

If there is a slip in the delivery schedule for the Orbiters, the increase could go higher. Costs could also be affected by changes in the spares policy.

The largest part of the project cost increase is for production of the three follow-on Orbiters, which, in fact, are developmental-type vehicles in that they are continually being upgraded. Some cost increase, under that circumstance, is not totally unexpected.

Rockwell International, Shuttle prime, has informed NASA that becuase of increased manpower requirements and the need for longer engineering work, its costs and the costs of its vendors and subcontractors on the Orbiter have gone up

substantially. In addition, improvements in the Orbiter ordered by NASA have raised costs. The total possible increase in Orbiter production costs in FY '83 is estimated at $150-$300 million.

The other area of increased costs is Shuttle Operations, including the increased costs for the lightweight External Tank which is behind schedule, as well as increased costs for the Solid Rocket Boosters and spares.

None of the projected increases in operations costs are related to the STS-1 flight, which, if anything, indicated that costs may be less than expected.

NASA is not yet saying that the $300-$500 million cost increase is a certainty. It believes that some of the increases may be subject to negotiation, although that may be optimistic. (DEFENSE DAILY, 7-10-81, p. 51, Vol. 115, No. 7)

**July 13:** Damage to the solid rocket booster system that helped propel the first space shuttle into orbit was largely confined to the aft skirt area and program engineers believe the causes of the damage have been isolated and can be eliminated in future missions.

Emphasis in the first mission, April 12, was on the ascent performance of the boosters and both functioned without anomaly during this phase. On descent, the nozzle extension was blown away at an altitude later determined to be too high, and stiffener rings in the aft skirt were found not to be strong enough to withstand the water impact.

The nozzle extension was severed from the spent booster when programmed to do so at apogee. This resulted in an unforeseen incidence of aerodynamic flutter that tore the thermal curtain. The resulting whipping action destroyed some of the instrumentation that measured temperature and pressure, according to George S. Morefield, chief engineer of United Space Boosters, the company that has the contract for installation, assembly and checkout of the booster system.

The thermal curtain protects against flame and radiant heating.

On the second flight according to Morefield, the integrated electronics assembly will be programmed to delay the nozzle extension severance from apogee, which was 270,000 feet in the first flight, until about 20 seconds after deployment of the main recovery parachutes at an altitude of approximately 1,500 feet.

"We don't care about the curtain as long as it works on ascent," Morefield said, "but we lost some instumentation." In addition to the later nozzle extension, power lines in the aft skirt will be wrapped with heat-reflective tape.

When the boosters descended during the first flight, there was outgassing and puffs of flame, which caused the insulation to ignite. Flames spilled over the edge and attacked the thermal curtain. The new procedure will keep the flame farther away from the curtain, Morefield said.

Redesigning the stiffener rings can not be finished in time for the scheduled September 30 second flight of the shuttle, but should be ready for the third and subsequent flights, he said. (AVIATION WEEK & SPACE TECHNOLOGY, 7-13-81, p. 57, Vol. 115, No. 2)

<> Economic importance of the solid rocket booster retrieval and refurbishment to the space shuttle program is underscored in an analytical projection of new versus refurbished booster costs carried out until about the mid-1990's.

One new booster system today costs $25 million. A refurbished booster has an estimated cost of $7 million. For a shuttle launch, according to the National Aeronautics and Space Administration analysis, the cost is $50 million versus $14 million. Precise assessment of the costs depends on a detailed study NASA and its contractors are conducting of components and structures that can be reused. (AVIATION WEEK & SPACE TECHNOLOGY, 7-13-81, p. 24, Vol. 115, No. 2)

**July 15:** Astronaut Richard Truly, who will pilot the second space shuttle flight, met briefly with reporters Wednesday to express confidence in Columbia and optimism for a September 30 launch.

Truly flew to the space center from Houston Wednesday morning to watch the closing of the shuttle's payload doors. The doors will be opened on the five-day flight so that scanning experiments can point toward the Earth.

The 44-year-old astronaut, dressed in blue NASA coveralls, said he and astronaut Joe Engle were very well prepared for the launch because they trained as a backup crew for the first flight. For five months in 1977, Truly and Engle flew space shuttle landing test flights.

Truly, a Mississippi native, is a Navy captain who has logged more than 5,000 hours in jet aircraft. He became a NASA astronaut in September 1969 and was the capsule communicator for all three of the manned Skylab missions and the Apollo-Soyuz mission.

Truly said the main difference for astronauts between the first and second mission of Columbia is that different computer programs will guide the spacecraft, and the second flight will be twice as long.

"We should be much more confident than at the first flight because we're sure those three engines work," Truly said. He said that three months before the first launch "scare stories were coming out of the woodwork," but he hasn't heard any this time. (SENTINEL STAR, 7-16-81, p. 3C)

<> Ten Idaho firefighters will be imported today to help extinguish a 1,000 acre blaze that threatens radio and radar facilities at Kennedy Space Center on the Merritt Island National Wildlife Refuge.

The blaze started Monday and is the most recent in a series of fires that have plagued the refuge for two months, charring hundreds of acres and killing two U.S. Fish and Wildlife officials in June.

The firefighters, from the Boise Interagency Fire Center, should arrive this afternoon, refuge manager Robert Lee said.

"They (firefighters) can provide us with the expertise to be more effective and can also give us a break," an exhausted Lee said late Tuesday evening. "We've been at this since I don't know when."

Lee said the fire jumped the NASA Causeway Tuesday and began threatening NASA facilities located by the Visitors Information Center. The facilities included small communications buildings and large radar discs.

Also, Lee said the U.S. Forest Service is sending in a special tanker plane this morning to dump a phosphate-based fire retardant on the blaze. (TODAY, 7-15-81, p. 1B)

**July 16:** With talk that America's exploration of space has been rejuvenated by the Space Shuttle project, officials and guests at Kennedy Space Center celebrated Thursday the first manned landing on a celestial body.

Sampling a 3-by-5 cake commemorating the 12th anniversary of the Apollo 11 launch, about 350 people crowded the Visitors Information Center to hear some nostalgic references to the team that put Neil Armstrong and Buzz Aldrin on the moon in 1969. Michael Collins remained in the command module which circled the moon.

None of the Apollo 11 astronauts attended the KSC celebration.

Donald E. Williams, commander of the U.S. Navy Astronaut Corps, called the Apollo 11 mission a "great event of modern times" and the first step toward space colonization.

"The destiny of the people of planet Earth is to leave this Earth and explore the rest of the universe," Williams said. "There's a lot out there and we haven't even begun to look at it."

Walter Kapryan, deputy director of Apollo 11 launch operations and now a manager for Lockheed Engineering and Management, said after the moon launch the American people became complacent and lost interest in space exploration.

He said the decrease in space program funding after the moon launch was a "national tragedy and a waste of one of our nation's most valuable resources. The Apollo 11 staff was just dispersed to the winds."

Now, Kapryan said, the nation's enthusiasm for space exploration has been rekindled by the Shuttle's success, which he believes is good.

"Without goals, individuals and nations stagnate. History has shown us that," he said. (TODAY, 7-17-81)

<> The Aerospace Services Division of Pan American World Airways, Inc., Cocoa Beach, Florida, has been awarded a one-year extension of its contract to supply medical services at NASA's John F. Kennedy Space Center and Cape Canaveral Air Force Station.

The $3,573,338 award covers the period July 1, 1981, through June 30, 1982, and brings the cumulative value of the contract since July 1, 1977, to $12,372,535. The new award marks the fifth year of service under a contract with a one-year basic term plus four one-year options.

Under the contract, Pan American will provide occupational medicine and environmental health services to civil service, military and contractor personnel.

Services are provided by physicians, medical technicians and nurses in facilities at KSC and Cape Canaveral Air Force Station. (KSC RELEASE No. 181-81, 7-16-81)

**July 17:** Frank Byrne, Deputy Director of Information Systems at NASA's Kennedy Space Center, has received a $10,000 Space Act Award from the NASA Board of Inventions for devising a computer launch system improvement. The award was presented to Byrne at a special ceremony at KSC on July 20 by Center Director Richard G. Smith.

Byrne received the award for his patented invention entitled "Common Data Buffer System." The common data buffer forms an important part of the Launch Processing System (LPS), which is used to checkout and launch NASA's Space Shuttle at

KSC. The system's basic function is to allow the individual computers of the LPS to communicate with each other. It launched the first Space Shuttle, and replaced the relatively antiquated Apollo launch system previously used. The U.S. Patent and Trademark Office issued U.S. Patent No. 4,254,464 covering the invention on March 3, 1981.

Byrne who lives in Cocoa Beach, Florida, invented the system while working in KSC's Directorate of Electronic Engineering. (KSC RELEASE No. 185-81, 7-17-81)

**July 20:** The review of U.S. space policy to be conducted by the White House Office of Science and Technology Policy under a specific directive from President Reagan will be completed by about Christmas and its results should impact the FY '83 Federal budget, Dr. George A. ("Jay") Keyworth II, the director-designate of OSTP told Senate confirmation hearings yesterday.

Keyworth has said that the interagency review of U.S. space policy to be concluded by OSTP will develop "the ideas and plans that will set the course" for U.S. activities in space "for years to come." He said the review will be one of his first major tasks as director of OSTP.

Senator Jack Schmitt (R-N.M.), chairing hearings by the Commerce Committee into Keyworth's nomination, said that the U.S. has not had a national purpose for its space program since the first manned landing on the Moon 12 years ago yesterday. That was "the end of our space purpose," he said. "While the Space Shuttle is a magnificent accomplishment, it is not a purpose."

Keyworth said that there is "considerable concern" in the administration about the future of space. He said the problem is sufficiently complex, including the problem of the "turf" of various agencies, that it will take five months to complete the review.

Schmitt expressed the hope that the findings of the review would be reflected in the FY '83 budget and in supplementals that may be submitted so that the space program could benefit, and Keyworth indicated that it would.

Asked by Senator Howell Heflin (D-Ala.) whether more coordination between NASA and the Defense Department on space is needed, Keyworth said that he felt that coordination should be strengthened, noting that appointment of former Air Force Secretary Hans Mark to be deputy administrator of NASA should help.

Questioned by Schmitt about the U.S. role in international cooperative research and development, Keyworth said that such programs are important to America. He added that U.S. commitments to international projects "absolutely must be honored," and he volunteered that he would be reexamining the Administration's decision to terminate the U.S. spacecraft for the International Solar Polar Mission (ISPM). (DEFENSE DAILY, 7-21-81, p. 105, Vol. 117, No. 14)

**July 26:** It's being called the case of the missing LOX, and it means the orbit of the second Space Shuttle will be slightly lower and slower than that of the first mission.

And it also has forced computer specialists to rewrite the Shuttle's flight program so that the rocketplane, scheduled for blastoff September 30, will be taking a different path into space.

LOX is NASA's abbrieviation for liquid oxygen, which is mixed with hydrogen to power the spaceship Columbia's three engines.

The problem is that after engineers analyzed data from early April's flight of the Shuttle, they found they couldn't account for nearly 4,000 pounds of liquid oxygen.

"We found we had a lower quantity at the end of the mission...than we had predicted," said Horace Lamberth, head of the fluid systems division at Kennedy Space Center.

And that could come from any one of three things, Lamberth said: The engines could have used more oxygen than expected; engineers could have miscalculated the density of the liquid oxygen they put into the tank, resulting in a lower quantity; or the size of the tank could have been miscalculated.

The problem is further complicated by the excessive amount of time it would take to pin down which of the three alternatives is to blame for the missing LOX.

"You can't wait until you get all that analysis done," said Richard Kohrs, Johnson Space Center's manager of systems integration in the Space Shuttle program office. "And we need the flight data from the second mission...So you go ahead and fly STS-2," he said.

But you fly it very conservatively just in case you run short of liquid oxygen. (TODAY, 7-26-81)

<> The Federal Aviation Administration has proposed a 180-day suspension of the license of a Cocoa pilot who flew into a restricted area minutes before the April 12 launch of the space shuttle Columbia, officials said.

But space agency officials, saying a catastrophe could result if pilots get away with flying too near Kennedy Space Center during liftoff, want Jerry Ralph Stevenson punished more severely.

Stevenson, 22, plans to appeal the FAA ruling at an informal hearing Tuesday with the agency's lawyer, FAA spokesman Jack Barber said in Atlanta. The pilot was notified of the recommendation by mail this week. (SENTINEL STAR, 7-26-81)

**July 27:** In addition to the six orbiter experiments to be conducted as part of the second space shuttle mission, four other experiments have been designated for flight on future shuttle orbiters. Three of the new experiments could be on the third shuttle mission if time permits and performance is met, according to Edwin C. Johnson, Jr., technical assistant for cargo integration in shuttle operations.

They are:
* Shuttle entry air data system.
* Shuttle upper atmosphere mass spectrometer.
* Shuttle infrared leeside temperature sensing.

The fourth experiment, technology flight instrumentation, will not be carried until after the fourth flight, when the orbital flight test program is scheduled for completion.

The shuttle entry air data system was devised to obtain more precise measurements of air data at speeds above Mach 3.5 at various angles of attack and sideslip. Its development depended on the ability to penetrate the shuttle orbiter reinforced carbon-carbon nosecap without affecting performance of the cap. The system consists of 14 penetrations for ports and tubes and 28 pressure transducers, which will provide measurements from an altitude of about 56 miles to touchdown. The upper atmosphere mass spectrometer will measure atmospheric constituents at altitudes higher than those to be investigated by the entry air data experiment. This information will contribute to calculations of static and dynamic force coefficients and derivatives in flight over the entry trajectory. The infrared leeside temperature sensing experiment is designed to provide high-resolution infrared imagery of the upper surface of orbiter wings and fuselage during reentry. The camera for this experiment will be housed in the top of the vertical stabilizer and will view the wings and fuselage through two windows that are transparent to the infrared spectrum and are cooled by gaseous nitrogen. The camera will operate from 5 minutes before entry through the descent phase.

Development flight instrumentation on board the orbiter Columbia totals 3,978 sensors. About 25% of these instruments will be retained for technology flight instrumentation experiments, which will concentrate on measurements of aerodynamics, aerothermodynamics and flight control. Modular auxilliary data systems that will process measurements will be located forward and in the cargo bay. (AVIATION WEEK & SPACE TECHNOLOGY, 7-27-81, p. 45, Vol. 115, No. 4)

<> Problems with the Space Shuttle Columbia's new mechanical arm have postponed a simulated flight test for another 16 hours.

The 32-hour test at Kennedy Space Center, which had already been pushed from Friday back to 8 a.m. today, has now been rescheduled for midnight tonight.

Technicians were still "troubleshooting" electrical problems with the arm's emergency jettisoning system Sunday night, said NASA spokesman Dick Young. The system allows the arm to be discarded if it won't fold back into place while in space.

The series of tests are primarily designed to prove that the Shuttle's payload, a bundle of instruments that will search the Earth's surface for minerals and other resources, has been connected to the spaceship properly.

Young said it is too soon to tell if the testing delays will affect the Columbia's move to the Vehicle Assembly Building scheduled for August 4. The Shuttle's second flight is set for September 30. (TODAY, 7-27-81, p. 10A)

<> Recommendation that the U.S. pursue development of a large, permanently manned space station as the next primary focus of its space program will be made to President Reagan by James M. Beggs, new administrator of the National Aeronautics and Space Administration.

Beggs told AVIATION WEEK & SPACE TECHNOLOGY he also would recommend to the President that he make a public statement of commitment to establishing a permanent U.S. presence in space as a way of helping focus efforts on an eventual station operation.

"Whether we are going to be able to bring a station through to a new start in the next three or four years is a short time horizon for this agency, but we sure are going to try," Beggs said.

"That clearly is where you go, because if you don't go toward the space station, then the real payoff on the space shuttle will not be achieved. You have to go space station if you are going to use the shuttle as it ought to be used.

"I think the probability is reasonably high that we can get a policy statement out of this Administration as to what we ought to be doing. I think we can get an early space policy document that continues the President Carter initiative. As to the President giving any type of commitment to the manned permanence thing, I don't know, I would not hazard to guess on that. We are going to try."

While Beggs will raise the space station initiative with President Reagan, the White House will be examining the course of the U.S. space program as a whole and the relationship between NASA and the Defense Department in space program developments. (AVIATION WEEK & SPACE TECHNOLOGY, 7-27-81, p. 23, Vol. 115, No. 4)

**July 28:** NASA's Kennedy Space Center has awarded Butler Construction Co. of Rockledge, Florida, a contract to construct security modifications to a room in KSC's Launch Control Center (LCC).

The value of the fixed-price contract is $235,000, and is to be completed 90 days after receipt of a notice to proceed. The contract was awarded July 23, and is one set aside for award to a small business firm.

Butler Construction is to supply labor, equipment and materials to construct modifications to Room 4R10 of the LCC. The modifications consist of construction of visual barriers, personnel access barriers, and installing sound suppression systems and personnel access control systems. (KSC RELEASE No. 187-81, 7-28-81)

<> A simulation of space shuttle Columbia's next mission ran into delays this weekend after NASA discovered it got its wires crossed on the ships's new mechanical arm.

Five to six wires on the 50-foot limb, which will hoist satellites into space on future missions, were incorrectly installed due to errors on the wiring diagram, said Charles Henschel, shuttle test director. One wire was left out.

Rewiring of the arm was expected to be completed Monday night and the simulated test was rescheduled for midnight, Henschel said.

Thirty-two hours of testing will begin with the dormant Columbia being awakened by its computer brains telling the spaceship it is flying.

Columbia will be fully powered, its life-support systems switched on, and its computers doing a "fake-out" to get the ship to "think it's in orbit," Henschel said.

"The prime purpose is to make sure the various systems are compatible," Henschel said. "Making sure the shuttle and its payload communicate is especially important," he said.

Testing begins with 5 1/2 hours of powering the ship, making it habitable, and starting the computers. Astronauts will later conduct a "mission run," which is a simulated ascent, orbit and descent. The tests and simulations will leave Columbia about 70 percent ready for launch, Henschel said.

The first crew aboard for routine checks will be support astronauts Dick Scobee and El Onizuka. Mission astronauts Joe Engle and Richard Truly and backup astronauts Ken Mattingly and Henry Hartsfield will participate at various times later in the test.

An astronaut crew will open the payload bay doors, switch on the scanning instruments, and check the robotic arm. The timetable for operating the scanners will be verified, and the instruments will be tested to ensure they are working correctly, said Eldon Raley, cargo operations director.

"This is an important payload for the benefit of mankind," Raley said. "Earth resources data is important to our future. The test is to prove that we can talk to the system that transmits data to the ground."

Engineers are no longer worried that the cargo pallet will be damaged by the excess blastoff stress that threatened Columbia on its first launch. Studies have shown that the 4,000 pounds of instruments are too light to be wrenched by the launch, said Jerry Kenney, payload mission manager. (SENTINEL STAR, 7-28-81, p. 6C)

<> A company hoping to offer the nation's first commercial satellite launching service raised its first rocket on a launch pad Monday after three days of delays caused by bad weather.

"I'm thrilled. It's just beautiful," said Charles Chafer, vice president of Space Services, Inc., after workers used a crane to lift the 55-foot-long spaceship onto the stand at Matagorda Island.

The company plans engine tests this wek -- a three-second "burn" today and a 25-second burn Wednesday -- and hopes to launch a suborbital flight August 12, company spokesman Walt Pennino said. The flight plan submitted to the Federal Aviation Administration calls for a three-mile flight that reaches an altitude of 14,500 feet.

That plan was contained in a request for a waiver of an FAA rule prohibiting unmanned rocket flight in controlled air space. (TODAY, 7-28-81, p. 10A)

<> A large water-spray system will be installed around the base of the space shuttle's solid rocket boosters to reduce engine firing pressure when the Columbia blasts off on its second flight, a NASA official said Tuesday.

The $1.5 to $2 million spray system will be designed and installed by mid-September and shouldn't dalay the shuttle's encore voyage, said Dr. Robert Gray, manager of the shuttle projects.

Although the schedule is very tight, all other preparations for Columbia's September 30 launch are on target. "If all goes supersmooth we can make it," Gray said. "At this point, we feel real, real good compared to the first launch because there are fewer unknowns."

Water from several 38-inch lines will be shot across the bottoms of the twin solid rocket boosters to absorb excess liftoff pressure which caused minor damage to the ship on its maiden launch last April.

The spray water system is the easiest solution to the pressure problem because it doesn't involve building burdensome additions to the launch pad, Gray said. Technicians have designed several other modifications to correct the overpressurization, but they would require too much work or delay the launch.

The problem on the maiden launch occurred when pressure created by the firing of the solid rocket boosters was deflected back to the ship. The force moved the entire shuttle-tank-rocket assembly, jarred the cockpit and flexed the wing flaps 6 inches.

Although the shock lasted only 20 milliseconds -- not long enough to be felt or recognized by the astronauts -- it created an "unacceptable" situation for future launches, Gray said.

The new system will be designed to shoot water, at the rate of 75,000 gallons per minute, across the primary holes to absorb the pressure. Gray said the water, which will come from a nearby storage tank, will be turned on for about 25 seconds.

Although a final decision on the water spray system was not expected until late Tuesday, Gray said he was 90 percent sure that it would be adopted. "It's the best system. We like it" better than the other modifications, he said. (SENTINEL STAR, 7-29-81, p. 2C)

**July 29:** A planned test firing of the first rocket designed for private commercial use had to be rescheduled Tuesday because engineers weren't satisfied everything was in order, a company official said.

"They (engineers) weren't satisfied that, mechanically, everything was in order," Space Services Inc. spokesman Walt Pennino said Tuesday after the five-second burn of the engine in the 55-foot Percheron rocket was postponed until Thursday.

"They didn't want to run that risk until all the fittings and instrumentation and pumping systems were in order," he said.

As for rescheduling the five-second test for this morning, Pennino added, "We can't guarantee that, either." (TODAY, 7-29-81, p. 14A)

<> The scheduled Tuesday transfer of the space shuttle to the Vehicle Assembly Building will be delayed one to three days due to problems encountered during preliminary systems testing, NASA said Wednesday.

The postponement will "very possibly" push back the Columbia's scheduled September 30 launch, although that hasn't been officially confirmed, said shuttle test director Charles Henschel.

"All I can say officially is that we're still on for September 30, but that's starting to look soft," he said.

"We're trying to juggle our schedule" to make the original launch date, Henschel added.

NASA crews will begin working full time on Sundays next week to pick up time.

The towing of the shuttle to the VAB, where it will be mated with its solid rocket boosters and external fuel tank, has been delayed because it took five days longer than planned to complete the simulated tests.

The space shuttle currently is resting in its glorified garage about 300 yards from the VAB.

Wiring and computer problems with the shuttle's payload system were the primary cause for the holdup, Henschel said. Those problems were solved and the test ended at 2 a.m. Wednesday.

Earlier this week, NASA discovered that four to five wires controlling the shuttle's new mechanical arm had been erroneously installed. One wire was left out completely. The 50-foot limb will hoist satellites into space. That arm is scheduled to be tested during the second flight but it won't do any lifting.

Two other problems arose Tuesday. The left payload bay door wouldn't open and a computer wouldn't verify movements of the mechanical arm.

Astronauts Richard Truly and Joe Engle tested systems in the cockpit Tuesday and were satisfied with the results, Henschel said.

Despite the problems, Henschel said the simulation was far better than the simulation for the maiden shuttle flight last spring.

Engineers said they are confident another potential problem area has been solved. There had been fears that modifications to prevent the shock and vibration experienced during the first launch would cause delays. (SENTINEL STAR, 7-30-81, p. 5C)

<> NASA's Kennedy Space Center has awarded a supplemental contract to Reynolds, Smith and Hills Architects, Engineers, Planners, Inc. of 2460 N. Courtney Parkway, Merritt Island, Florida. The contract is for a study of KSC's launching facilities to be conducted to see if modifications are needed for use of the Centaur upper stage as part of the Space Shuttle system.

The value of the fixed-price contract is $834,872, and brings the total amount of the Reynolds, Smith and Hills contract at KSC to $863,868. The new contract covers the period of 73 days from award. The contract was awarded July 22. The study is to be conducted at Reynolds' Merritt Island, Florida, facilities.

The contract supplement calls for Reynolds to perform a study of possible modifications to NASA's Space Shuttle launch facilities to accomodate a Centaur and payload in a shuttle orbiter payload bay. These facilities include Mobile Launcher Platform 2 and the Rotating Service Structure and Fixed Service Structure at the Complex 39 launch pads. (KSC RELEASE No. 188-81, 7-29-81)

**July 30:** An Air Force Space Division/Boeing Aerospace Inertial Upper Stage test vehicle has arrived at Cape Canaveral for launch checkout of the first flight vehicle scheduled for next year.

Called a Pathfinder, whose UTC solid rocket motors and ordnance devices are loaded with inert material, the vehicle will be used to duplicate the exact flow of IUS hardware from shipment of components to integration to launch readiness.

Taking part in the test will be flight-type hardware of a Martin Marietta Titan 34D launch vehicle, the IUS Pathfinder test vehicle, and a spacecraft model. The test is considered a critical phase in the IUS development program because the first flight mission is operational. (DEFENSE DAILY, 7-30-81, p. 163, Vol. 117, No. 21)

<> About a tablespoon of toxic rocket fuel was responsible for an evacuation of the Orbiter Columbia's hangar at Kennedy Space Center on Thursday afternoon.

More than 100 Space Shuttle workers were evacuated for an hour from the Orbiter Processing Facility after fuel dripped from the Columbia. Fire and safety teams easily extinguished a thermal protection blanket that began smoking at the rear of the Orbiter.

No injuries or damage to Shuttle hardware occurred, said KSC spokesman Rocky Raab.

Firefighters with Wackenhut Services responded to the 2:30 p.m. accident.

"Anytime something happens at the Orbiter Processing Facility and that bird is in there, we are very interested. It was taken care of and well under control," said one Wackenhut Services employee.

Raab said there were no flames involved. But he added the hypergolic fuel that dripped from a small thruster engine at the rear of the Orbiter is highly toxic and began to smoke on the blanket.

"The men who were working with the thrusters were wearing protective self-contained suits" that are designed to protect against inhaling the "high-powered fuel," Raab said.

He said while there was no immediate threat to workers in the facility, the evacuation was necessary as a precaution. The Shuttle workers were moved to the facility's parking lot.

The evacuation was orderly "and followed normal procedures," said KSC spokesman Al Seeschaaf.

"Someone saw the smoke and immediately set the alarm off and then there were bells, sirens and flashing lights everywhere," he said.

The accident happened while Shuttle workers were replacing a thruster engine at the right-hand side of the rear of the Orbiter.

Apparently, there was some residual fuel in one of the lines, a spokesman said.

The Orbiter's 44 thrusters are used to fine tune the spaceship's path once it is in orbit. (TODAY, 7-31-81)

**July 31:** A man from West Germany wants to know how America found the expertise to send a space shuttle into orbit when it couldn't properly hang its own flag.

Jason Matthews, a schoolboy in Nottinghamshire, England, writes that the American flag adorning the Columbia looks different from the one in his encyclopedia.

They're just two of the many people who are asking the same question: "Say, can't you see that Old Glory is hung backward on the space shuttle?"

NASA is used to questions. When 50 callers and letter writers insisted that the Stars and Stripes had been reversed, the space center promptly typed a reply.

Its reply to the letter writers is simple -- the flag isn't backward, your perception is.

U.S. regulations state that when the flag is displayed on aircraft, the star field precedes the stripes in the direction of aircraft movement. The flag on the shuttle is supposed to appear to be flying from a mast.

According to those rules, the Stars and Stripes was applied to Columbia with a silica-base, heat-resistant paint that can withstand heat up to 1,200 degrees Fahrenheit.

The public confusion stems from a NASA-released photograph of the Columbia's April 14 landing at Edwards Air Force Base in California. The picture, which was widely reprinted in newspapers and magazines, shows the shuttle's right side as its rear wheels touched down on the Mojave Desert.

From that angle, the flag looks unusual because the star field is in the upper right-hand corner, said NASA spokesman Rocky Raab on Thursday.

"That's why people are curious," he said. "If they saw the flag on the other side they wouldn't have said anything because it looks correct from there, because the star field is in the upper left-hand corner."

Doris Mauney, who has answered NASA mail for more than five years, said most letter writers are trying to help rather than rib the space center.

"Most of them point it out in a nice way to help us," she said. "Apparently, they felt they were the only ones who noticed and they hoped that no one else would. However, the man from West Germany was nearly irate about it."

The flag correspondence, from adults and children around the United States and Europe, is just a small part of the new interest in NASA that officials attribute to Columbia's successful mission.

"Dear NASA" letters are being posted at an average of 10,000 a month, as opposed to 3,000 a month five years ago.

But the flag observers, Raab said, are still relatively few compared to those who ask the most frequent questions about the space program -- "How do I join?" and "How do the astronauts go to the bathroom?" (SENTINEL STAR, 7-31-81, pp. 1A & 8A)

**August 1:** Robert A. Foster, formerly director of Computer Sciences Corp.'s Applied Technology Division in Houston, has been named director of the division's Kennedy Space Center operations. He replaces Thomas Williams who was recently named president of the division. E. P. Boykin, formerly head of finance and administration for Computer Sciences Corp. at KSC, has been promoted to director of the Houston operations, Foster's former post.

The Applied Technology Division is KSC's largest operating unit. (TODAY, 8-1-81)

**August 3:** Astronauts Joe Engle and Richard Truly won't be caught kicking the tires on this Space Shuttle, even if it is the world's first used spacecraft.

"I wish I could buy a used car that looked as good," Truly said during a news conference from Johnson Space Center in Houston Monday.

Appearing before the press in a video hookup aired simultaneously in Houston, Washington, Huntsville, Alabama, and Kennedy Space Center, the astronauts said they feel confident the Shuttle will perform as smoothly the second time around as it did in April.

"We're going to be ready when the bird's ready," Engle said.

They predicted certain modifications inside the Orbiter Columbia should make the scheduled September 30 flight easier than the trip taken by Bob Crippen and John Young last April.

Included in those changes is a wireless communications headset that "will reduce the number of cords in the Shuttle and make space flight a lot easier. We won't be getting tangled up in each other," Truly said.

Young and Crippen had complained about getting caught in the "spaghetti" attached to their headsets.

As for any advice the second pair of Shuttle astronauts received from their predecessors Truly quipped jokingly, "Yes, don't do anything dumb."

The astronauts also discussed the more serious prospect of a venture out of the Columbia and into space to fix a robot arm if it should fail to fold back into the Orbiter's payload bay.

The arm, to be tested during the five-day flight, is designed for future missions to retrieve or launch satellites from the cargo bay. "If we could fix it by EVA (leaving the Orbiter) we would. If we couldn't, we would jettison the arm," Truly said.

But they said they will approach this mission conservatively and in the event of any failure in the ship's hardware, they will return early. (TODAY, 8-4-81)

**August 5:** A jumbo tractor-trailer, carrying a 60,000-pound steel slab to the Kennedy Space Center, ripped out a section of railing on the Titusville Causeway Wednesday morning.

One of the three Boeing Services International workers aboard the NASA trailer was taken to Jess Parrish Memorial Hospital in Titusville following the 10:15 a.m. mishap.

Paul Dumont, 48, of Titusville, was listed in stable condition Wednesday night with a fractured left arm.

According to witnesses, the trailer that was hauling a steel plate from Mims Industrial Steel Inc. edged too close to the westbound lane of the bridge on County Road 402.

One of the trailer's massive back tires jumped the curb and brushed along about 20 feet of the concrete railing, crumbling it.

The trailer was traveling east, but because of its size -- 20 feet wide -- it took up both lanes.

Brevard County Commissioner Gene Roberts estimated damage to the county bridge at under $10,000.

No charges have been filed in the accident, and a Florida Highway Patrol spokesman said it is still under investigation.

The steel plate, being transported to launch complex 39, is designed for modifications to the Space Shuttle pad but not for the scheduled September 30 launch.

It would be used to shield the Orbiter against the shock of the solid rockets during ignition. (TODAY, 8-6-81)

<> Special spacecraft fans donated by NASA to the Smithsonian Institution have been retrieved from the museum by the agency's Marshall Space Flight Center and will be used on Space Shuttle missions.

NASA said that if it had to purchase the fans new today, they could cost more than $22,000 each. It estimated that the saving from reuse of the fans could exceed $500,000.

The fans, of the type used to provide ventilation inside the Apollo Command Module after splashdown and to circulate air aboard Skylab, were removed by Marshall from the backup Skylab on display at the Smithsonian's Air and Space Museum.

Of the 35 fans tested, 25 will be available for up to 10 flights each aboard the Space Shuttle, NASA said. To date, 13 of the fans have been programmed for use, e.g., one will be used to circulate air in the Spacelab transfer tunnel, another will serve as a flight spare, and two will be used in a cosmic ray experiment on the second Spacelab mission. (DEFENSE DAILY, 8-5-81, p. 195, Vol. 117, No. 25)

**August 6:** NASA Inspector General June G. Brown has initiated a review of the production phase of the Space Shuttle Orbiter program aimed at ensuring that money for the program is properly expended. The review, to be completed by March, will include participation by the Air Force Inspector General and is designed to ensure that "appropriate controls and safeguards are in place to the expenditure" of billions of dollars for Shuttle production. The requirement for spare parts and identification of alternate sources of supply, and contract changes will be among the subjects of the study. A NASA spokesman described the review as

"preventative" and not connected with allegations that Rockwell used funds allocated for Shuttle production for Shuttle development. (DEFENSE DAILY, 8-6-81, p. 202, Vol. 117, No. 26)

**August 7:** Despite the destruction Wednesday of the prototype 55-foot, 60,000-pound thrust Percheron rocket when its engine exploded during a planned 3-4 second test, the companies building the rocket as a commercial launch system say they plan to build a new rocket and continue with the program.

It was estimated that it would take from six months to a year to get another rocket ready.

The Percheron (named after a French draft horse) project is being conducted by Space Services, Inc. of Houston, Texas, headed by David Hannah, Jr., a real estate developer, joined by a group of private investors. The rocket is being built for Space Services by GCH Inc. of Sunnyvale, California, which is headed by Gary C. Hudson, a 31-year old, self-taught engineer, and employs 17 engineers.

The companies have projected start-up costs of $10 to $30 million for the Percheron project and have spent something over $1.2 million to date.

The 55-foot Percheron rocket, bolted to its launch stand on Matagorda Island, Texas, blew up shortly after 5 PM Wednesday after engineers began the countdown for the first preliminary test firing of the kerosene and liquid oxygen-fueled engine.

GCH engineers said that they believe the explosion was caused by the failure of the small liquid oxygen valve to open, which caused kerosene to run onto the engine. They believe the kerosene caused a small explosion in the engine compartment that in turn caused the kerosene tank to explode hurtling the top two-thirds of the rocket 200 feet into the air. Four pieces of the rocket landed back on the ground, causing no injuries. The rocket's base remained bolted to the stand.

Space Services, which had said its chances for a successful test firing of the engine were about 50/50, had planned to follow a series of three static tests with a six-mile suborbital test flight of the rocket this month. The company had received FAA clearance for the test Wednesday.

Long-range plans called for conducting an orbital test flight of the vehicle later this year from an unnamed site and conducting six such tests over the next two years, with the vehicle to be declared operational in 1983.

Planning to undersell both the Space Shuttle and Ariane launch vehicles, Space Services has said that it expected to charge from $3 to $5 million to place a 2000-3000 pound payload in low Earth orbit, and $15 to $16 million to place a 5000 pound payload into geosynchronous obit. (DEFENSE DAILY, 8-7-81, p. 210, Vol. 117, No. 27)

<> NASA's new inspector general June G. Brown told DEFENSE DAILY Wednesday that the recently instituted review by her office of the production phase of the Space Shuttle Orbiter program is aimed at uncovering "weaknesses" in NASA's acquisition system for the Orbiters.

The objective is to avoid costs before they occur by instituting more controls where they are needed, she said.

Asked if the review was prompted by allegations now being investigated in the courts that persons in Rockwell International, Shuttle prime, charged funds used for other programs to ongoing Shuttle development, Brown said it was not, and that the review is not going over any "specific problems."

She indicated that the magnitude of the Orbiter production program and the amount of money still to be spent is the driving factor in the study, which she said was fully endorsed by former acting NASA Administrator Dr. Alan Lovelace.

Asked if she planned to initiate similar reviews of other NASA programs, Brown said she did not, primarily because the majority of her staff, up to 20 people at times, will be involved in the Orbiter production study, and because there are no other projects of this magnitude currently extant.

The NASA IG review is to focus on "finanical and project management, including contract changes" in the Orbiter production program. (DEFENSE DAILY, 8-7-81, p. 209, Vol. 117, No. 27)

<> The Navy's FLTSATCOM-5 communication's satellite, which will serve as an on-orbit spare for the constellation of four spacecraft now providing global military satellite communications coverage, was successfully launched at 4:16 AM EDT yesterday from Cape Canaveral aboard a General Dynamics Atlas-Centaur vehicle. The 2300-pound spacecraft is built by TRW's Defense Space Systems Group. It will be positioned in geosynchronous orbit at 93 degrees west longitude above the equator, a position selected because it is a heavy traffic area for FLTSATCOM's mobile users. The four-satellite FLTSATCOM system provides high-prority UHF communications relay links between 900 ships, submarines and aircraft of the Navy fleet and selected ground stations, between a thousand Air Force aircraft and air-to-ground terminals, and SAC. (DEFENSE DAILY, 8-7-81, p. 211, Vol. 117, No. 27)

<> Kennedy Space Center Deputy Director Gerald D. Griffin announced his resignation from NASA today, to be effective August 22. He has accepted a position with Scott Science and Technology, Inc. (SST), of Lancaster, California.

Griffin will serve as Vice-President for Operations with SST. SST is an international corporation dealing primarily in research and development of high technology products and systems. The corporation has offices in Albuquerque, Colorado Springs, Houston, Los Angeles, and London, as well as corporate headquarters in Lancaster where Griffin will be located.

Griffin recently returned to his full-time position as KSC Deputy Director. Since July 1980, he had been serving in the dual role of Acting Associate Administrator for External Relations at NASA Headquarters and Deputy Director of the Kennedy Space Center. He was named to the Kennedy post in May 1977 after serving one year as the Deputy Director of the Dryden Flight Research Center.

Griffin was named NASA Assistant Administrator for Legislative Affairs in 1973 and later was appointed Deputy Associate Administrator (Operations) in the Office of Space Flight, serving in that position until 1976.

Before joining NASA Headquarters, Griffin worked at NASA's Johnson Space Center where he was a Flight Director for all eleven manned Apollo missions. He was lead Flight Director for Apollos 12, 15, and 17. Previously, he was flight controller in Mission Control for Gemini missions. He joined the Johnson Space Center (then Manned Spacecraft Center) in 1964 and was named Flight Director in 1968. (KSC NEWS RELEASE No. 194-81, 8-7-81)

<> Boeing Services International, Inc., Kennedy Space Center, Florida, has been awarded a supplemental agreement to an existing contract with NASA's John F. Kennedy Space Center. The award provides for Boeing to handle supply and transportation services at the Space Center and adjacent Cape Canaveral Air Force Station.

The value of the cost-plus-award-fee agreement is $13,545,786, and brings the aggregate contract value to $41,435,032. The one-year supplemental contract covers the period from July 1, 1981, through June 30, 1982.

The contract supplement calls for Boeing to continue supply and transportation functions at both the Kennedy Space Center and Cape Canaveral Air Force Station. The supply functions include operations at the Central Receiving Facility and various supply warehouses located throughout the two installations. These supply facilities provide technical and administrative materials that are required for everyday operations, and replenish materials that have been requisitioned. Transportation functions include handling outgoing shipments for NASA and contractor organizations from KSC and Cape Canaveral Air Force Station.

The new award represents the fourth year of service under a contract for one year plus four one-year options. (KSC RELEASE No. 193-81, 8-7-81)

**August 8:** Federal Firefighters, using a tanker plane dropping fire-retardants, stopped the progress of a brush fire that broke out Saturday south of the Merritt Island National Wildlife Refuge and threatened to move north.

About 20 firefighters set up a fire line in hopes of containing that blaze that erupted about 3 p.m. along the Indian River about 4 miles west of the Kennedy Space Center

industrial complex and a mile south of the NASA Parkway, said Jack deGolia, spokesman for the U.S. Fish and Wildlife Service.

Les Tschohl of the U.S. Bureau of Land Management originally estimated that the fire had spread across 300 acres of palmetto and brush within two hours. But after some of the smoke cleared, officials learned that only 50 acres had been burned, deGolia said.

Authorities said that if the fire had gone north to the wildlife refuge it probably would have threatened one house in the area. Federal firefighters stationed a pumper at the home to protect it, deGolia said. (SENTINEL STAR, 8-8-81)

**August 10:** The Shuttle Orbiter Columbia was expected to roll from its hangar to the Vehicle Assembly Building at 4 a.m. today.

The 300-yard tow had been delayed four hours from midnight because many chores were taking longer than expected, Kennedy Space Center spokesman Mark Hess said Sunday.

The transfer was expected to last about an hour.

Once inside the cavernous VAB, workers will begin hoisting the Orbiter to a vertical position so it can be linked to its silo-like external fuel tank and two 150-foot-tall booster rockets.

The move from the Orbiter Processing Facility to the VAB was originally scheduled last Tuesday. But the trip was postponed several times because of wiring problems in the device deploying the robot payload arm.

Officials said they do not expect the delays to postpone the September 30 launch date, but said the schedule is extremely tight and more trouble could push it back.

The Shuttle is scheduled to roll out to Launch Complex 39A on August 26. (TODAY, 8-10-81)

<> Combination water cascade/trough system was selected last week by the National Aeronautics and Space Administration as the method to deflect the pressure caused by ignition of the two solid rocket boosters in the space-shuttle launch system.

Modifications to the launch pad and mobile launch platform began August 4 and NASA said the work will not affect the scheduled September 30 launch date of the second space shuttle.

Because of a delay in transferring the orbiter to the vehicle assembly building from the orbiter processing facility, NASA elected to waterproof thermal protection system tiles before the transfer. The waterproofing operation was performed by hand using aerosal cans.

Originally, waterproofing was to have been done with a spray boom, but the opportunity to complete the job before transfer to the vehicle assembly building will save two days in this facility.

Transfer of the orbiter was put off from August 4 by a delay in completing the orbiter integration test. (AVIATION WEEK & SPACE TECHNOLOGY, 8-10-81, p. 27, Vol.115, No. 6)

**August 11:** The tedious task of attaching the external tank and solid rocket booster stack to the Orbiter Columbia got under way Tuesday morning at the Kennedy Space Center's Vehicle Assembly Building.

The first step was to hoist the spaceship to a vertical position for attachment to the three connection points on the 154-foot high external tank.

By late Tuesday afternoon, the Orbiter had been securely bolted to two of the tank's connections.

A mechanism that retracts the landing gear at the nose of the Orbiter was not operating properly. In addition, there was a problem with the electrical wiring in the ground support equipment which is also involved with the Orbiter's nose landing gear.

The Orbiter's landing gear must be fully prepared during this stage of the checkout. The next time it will be extended is when the spaceship lands on the runway at California's Edwards Air Force Base at the end of its mission.

Before the landing gear was retracted, films were made of every part of the nose wheel well.

Only about 63 thermal protection tiles remain to be bonded to the Orbiter between now and the Shuttle's move to the launch pad, set for August 26.

The second blastoff of the Space Shuttle Columbia is scheduled for September 30 and KSC officials say mating operations are smooth enough so that the launch may go on time.

The next important date in the Shuttle's road to launch is an interface test which will determine if the three Shuttle components -- Orbiter, solid rocket boosters and tank -- all work in concert. (TODAY, 8-12-81)

<> The space shuttle Columbia received a small jolt Monday when a forklift carrying an access platform bumped into a wing flap and damaged two of its thermal protection tiles.

The accident occurred a few hours after the spaceplane was towed a quarter-mile from its hangar to the monolithic Vehicle Assembly Building, where it's scheduled to be reunited with its solid rocket boosters and equipped with an external fuel tank.

Space center spokesman Dick Young said the damage was minor and shouldn't affect the timetable for the shuttle's scheduled September 30 launch.

The ruined tiles were removed shortly after the collision and will be replaced after the orbiter is mated with the twin boosters and fuel tank. That union was scheduled to begin Monday night and will take several days to complete.

An August 26 target date has been set for rolling the rocket-tank-orbiter assembly to the launch pad. But officials on Monday were far from reassuring about meeting the deadline.

"We just might make it," said George Page, shuttle launch director. "The next three days will tell us. It looks good but there's a lot of work to be done."

Kennedy Space Center Director Dick Smith said it will be "a bit of a struggle" to make the September 30 launch. "There's still a reasonable chance, but it's more work than we initially anticipated. Remember, this is the first time we've ever processed a vehicle to fly again."

Page and Smith both said the shuttle is in better shape now compared to preparations for the first flight.

"We've learned a lot of things, but there's still more to learn," Smith said. (SENTINEL STAR, 8-11-81)

<> Every year they visit from deep space, flashing across starlit skies for a few sultry days in August. Their return to the void is as silent as their arrival.

The Perseid meteors are back to perform, beginning tonight.

Commonly known as shooting stars, meteors are tiny chunks of rock, iron, and ice ranging in size from less than an inch long to the size of basketballs.

Almost all disintegrate during their fall through the earth's atmosphere, leaving a glowing trail through the night sky.

A few meteors can be seen on any clear night, but during the Perseid shower they become a celestial Fourth of July with 60 to 80 sighted an hour.

Despite interference to viewing from a bright, full moon, this year's heaviest meteor activity is expected tonight, Wednesday night and early Thursday morning before sunrise.

The only rules for good meteor gazing is to pick the darkest spot possible and scan the entire sky, said Robert Wood, Brevard Community College professor of astronomy and director of the college's observatory.

"Just lean back in a lawn chair and look," Wood said.

Traveling in a westerly direction, the meteors appear to originate from the constellation Perseus -- hence the name Perseid meteors.

Dating from the breakup of an ancient comet, the Perseid meteors travel as fast as 30 to 40 miles per second and start burning to a cinder about 80 miles above Earth.

And they will be visible from anywhere on the globe.

"Most burn up but some could strike the earth," said Wood, adding the likelihood is remote.

The meteors, traveling in a cluster, orbit the sun in the same manner as the Earth.

Steve Morgan, a member of the Brevard Astronomical Society, said veteran star gazers will be disappointed with this year's shower.

The problem is with another heavenly body -- the moon.

"A full moon really makes it hard to see," Morgan said. "A lot of people will sit this one out." (TODAY, 8-11-81)

**August 12:** The Space Shuttle's rollout to the launch pad will be delayed by one day due to a slower than expected attachment of the spaceship Columbia to its fuel tank and rocket boosters.

The mating of the Shuttle components was completed Wednesday and a series of tests of the entire Shuttle stack are scheduled to start no sooner than Saturday, Kennedy Space Center officials said.

One problem in mating was a simple one-inch movement of the Columbia during its connection to the external fuel tank's forward attach point.

"This required repositioning the vehicle. Even one inch could throw a number of interfaces (critical connections between the Columbia and tank) out," said space center spokesman Dick Young.

Between now and the scheduled August 27 rollout to the launch pad, Shuttle workers must hook up cables between the tank and the Orbiter that will fuel the Shuttle's main engines with liquid oxygen and liquid hydrogen.

It will take the remainder of the week to properly hook up the lines which serve as a vital electrical link between the Orbiter and the 154-foot high tank.

The five-day, full-stacked Shuttle test will involve two simulated countdowns, mock ascent and descent.

During the procedure, astronauts Joe Engle and Richard Truly will test their space legs in the Orbiter.

The Space Shuttle mating, in the Vehicle Assembly Building, began Monday after the Orbiter was towed 300 yards from its hangar.

KSC officials said the one-day rollout delay should not postpone the scheduled September 30 launch. (TODAY, 8-13-81, p. 16A)

<> NASA's Voyager 2 spacecraft, after a flight of four years and 1.24 billion miles, will fly by the planet Saturn at a distance of 63,000 miles above the planet's cloud tops on August 25, returning 18,500 pictures of the planet, its rings and its moons and taking other scientific measurements.

The photographs and data returned by the spacecraft will augment and refine the earlier findings of its sistership, Voyager 1, which flew by Saturn at a distance of 77,000 miles nine months ago.

Voyager 1 was launched August 20, 1977, from Cape Canaveral aboard a Titan-Centaur rocket. Voyager 2 was launched September 5 on a faster, shorter trajectory.

Both spacecraft were designed and built by NASA's Jet Propulsion Laboratory. (DEFENSE DAILY, 8-12-81, p. 238, Vol. 117, No. 30)

**August 13:** A military communications satellite launched a week ago has developed an onboard power failure.

U.S. Air Force officials are now searching for the cause of the malfunctioning power system, a problem that could keep the system from operating at full strength.

"It's premature to say now if it is a good or a bad satellite. We haven't fully activated all the parts" (including its communications machinery), said Earl Gray, spokesman for the space division of the Air Force System Command.

The FLTSATCOM satellite, the last in a series of five, was sent into orbit from Cape Canaveral Air Force Station before dawn August 6 and developed problems within hours of launch.

The major difficulty is with a power system designed to point the satellite's solar panels toward the sun and its communications antennas toward Earth, Gray said.

A second difficulty, a wobbling of the craft, has been corrected, Gray said. (TODAY, 8-13-81)

<> Boeing Services International, Inc., Kennedy Space Center, Fla., has been awarded a supplemental agreement to an existing contract with NASA's John F. Kennedy Space Center. The award provides for Boeing to perform Ground Support Operations services for a fifth contract year at the Space Center.

The value of the cost-plus-award-fee agreement is $63,381,627, and brings the aggregate contract value to $257,242,135. The one-year supplemental contract covers the period from July 1, 1981, through June 30, 1982.

Ground Support Operations that Boeing handles at KSC include operation and maintenance of the huge Crawler Transporters used to transfer the Space Shuttle to the launch pads. Other functions include handling toxic wastes, operation of heavy equipment such as the cranes used in the Vehicle Assembly Building and the Orbiter Processing Facility, minor repairs to KSC buildings and facilities, and general office moving functions.

The new award represents the fifth year of service under a contract for one year plus four one-year options. (KSC NEWS RELEASE No. 196-81, 8-13-81)

**August 14:** Some NASA officials have grumbled that "The Right Stuff" is the wrong stuff to show the public about America's first manned space program.

But NASA has tentatively approved the movie anyway -- and it's the biggest entertainment production ever to receive space agency cooperation, according to a NASA spokesman.

Chardoff-Winkler, the maker of "Rocky" and "New York, New York," plans to begin filming the movie version of "The Right Stuff" at the space center in January.

NASA officials have cleared the first draft of the film's script, which was inspired by Tom Wolfe's irreverent, naked-eye chronicling of the space program circa 1958 - 1963.

The script was written by William Goldman, author of "Lord of the Flies." And final approval is expected after NASA officials read the script revisions, which are being written by the film's director.

Chardoff-Winkler needs NASA's blessing before it brings cameras and crew to the space center next year.

Without a working agreement with the space agency, Chardoff-Winkler would face the heavy expense of building recreations of the old Mercury control rooms on Cape Canaveral and other space center equipment to be used in the film.

The producers also want to include NASA footage of the Mercury launches because "some of that early stuff cannot be reproduced," Executive Producer Hal Polaire said in a telephone interview from his office in Culver City, California.

It appears that Chardoff-Winkler will get what it needs to make the movie, said Byron Morgan, head of NASA's motion picture bureau in Washington. (SENTINEL STAR, 8-14-81, p. 1-A)

**August 17:** A California businessman has donated payload Shuttle flights to a Brevard group that promotes science for young people.

"Col. Frank Lenahan has given us four payload reservations and may let us have five more," said Drazen Premate, 25, founder of the non-profit Inter-Space Society. The Society helps place student science experiments in space through the use of NASA's "Get-Away Special" Program.

"Lenahan is giving us number 32 and three other numbers from 41 through 48," Premate said. "That puts us right near the top of the list of 350 reservations."

A retired Air Force fighter pilot and aerospace researcher, Lenahan said he wants to see young people involved in science research.

"The Space Shuttle program has a lot of potential and the place to get great ideas is out of high school and college students," he said. "Nothing would make me happier than to see their projects succeed."

The Get-Away Special (G.A.S.) was announced by NASA in 1976 as a program for using leftover cargo space on Space Shuttle missions. The extra room will house special containers with science experiments to be carried into low earth orbit at $50 per pound.

NASA will furnish soup-can shaped containers for the experiments in two sizes: 5 cubic feet and 2.5 cubic feet. Each canister can hold six or eight experiments and can weigh up to 200 pounds.

Reservations for G.A.S. payloads cost $500 per container, and the experiments will fly on a space-available, first-come, first-served basis. (TODAY, 8-17-81, p. 1-B)

<> A series of integrated tests on the Space Shuttle were postponed from Saturday to 8 a.m. today because mating the spaceship Columbia with its external tank took longer than expected, said Kennedy Space Center spokesman Dick Young.

The five-day tests of the Shuttle elements -- Orbiter, booster rockets and external fuel tank -- are designed to make sure everything has been connected correctly and all the components work as a system, Young said.

During the latter part of the tests, crew members will simulate an ascent to orbit, descent and landing, and a return to launch site. Young said if something goes wrong during the Shuttle's flight before it is too far out of range, the Orbiter can make a 180-degree turn and return to Kennedy Space Center.

There has been no official assessment yet to determine if the latest delay will affect the launch date of September 30, Young said. (TODAY, 8-17-81, p. 10-A)

<> Kennedy Space Center is faced with a new challenge almost as great as designing and launching the first Shuttle -- making it do what it's supposed to do.

When NASA engineers came away from their draft boards and planning tables back in the early 1970s, they told their budget-conscious bosses they had come up with a spaceship that could be landed, patched up and put back into orbit within 160 hours -- or just about a week's time.

That was nine years ago. Now, if the second shuttle flight is launched on time in late September, it will have taken more like two dozen weeks to prepare the Columbia for launch.

And KSC planners say they'll be lucky to achieve a 10-week turnaround by the ninth flight -- much less the flight rate of 40 Shuttles a year scheduled for 1990.

"It's mind boggling if you think of it in terms of the way we do business today," said Wes Branning, head of a committee charged with coming up with ways to shorten turnaround time.

Branning's committee, nicknamed STAG for Shuttle Turnaround Analysis Group, must figure out how NASA is going to launch 334 Shuttles from KSC by 1994.

"We must radically change the way we process the vehicle," Branning said.

Some of the changes Branning's committee has in mind are relatively simple: installing permanent jacks in the floor of the Orbiter's hangar; changing the way payloads are attached to the Orbiter so they can be replaced more quickly; and streamlining checkout operations.

Other changes will be more difficult. The committee plans to reduce testing by 50-60 percent. The way various elements of the Shuttle are put together must be simplified. That means major design changes.

And one change Branning's committee has recommended is the simultaneous loading of volatile and toxic fuels. These fuels have always been loaded separately in the past.

Loading them in concert is unprecedented and likely to be controversial, especially with hypergolic fuels -- designed to ignite when they come in contact with one another.

Branning said his committee anticipates some resistance from veterans.

"We didn't do those things back in the old days," he said. "But in those days we were using primitive hardware. Since then we've developed our design capability to the point that it's safe to do these sort of things."

According to Branning, these mechanical changes to the Shuttle and to KSC's facilities will not be difficult technologically.

"In developing the Shuttle, some of the problems we ran into with the thermal protection system (the tiles) and the main engines were pushing the state of the art," Branning said. "The type of changes we're making right now to get us to an improved turnaround are well within the state of the art."

But the changes won't come cheaply. "We're getting ready to put a lot of money into making the system achieve its operational goals," said one upper-level manager recently. Branning stressed that every change is being analyzed to make sure the "payback" merits the expense.

Though expensive, the mechanical changes will prove relatively easy. It's just a matter of getting them designed, approved and implemented.

But other changes more difficult than the mechanical ones must be made -- changes in philosphy at KSC that money can't buy.

"The problem you have is NASA has always worked in an R & D (research and development) environment," Branning said. "KSC does not have an operational philosphy like the airlines do. The airlines have R & D folks who design their planes, develop them, get all the bugs out of them and then turn them over to the airlines as operational aircrafts.

"We've got to educate our R & D people to come into an operational phase."

"To me," said Robert Buckley, formerly the chairman of Branning's committee, "we can design the most efficient flight and ground hardware, but the manner in which we operate and manage our people has to be changed." (TODAY, 8-17-81, pp. 1-A & 10-A)

<> Kennedy Space Center has awarded a $4.3 million supplemental to Modular Computer Systems Inc. (Fort Lauderdale, Florida) to provide additional mini-computers and peripherals for the Checkout Control & Monitor System of the Space Shuttle Launch Processing Systems at KSC and Vandenberg AFB, California. The award, which runs through December 1982, brings the value of the MCSI contract to $31.9 million. (DEFENSE DAILY, 8-17-81, p. 259, Vol. 117, No. 33)

**August 18:** "We've been operating here at Kennedy Space Center essentially the same way for the last 20 years," said Robert Buckley, head of KSC's operations planning office.

And it's past time to change.

Here are some of (the) changes Buckley and other planners want to make:

*Reduce paperwork by 50 percent.
*Computerize day-to-day operations.
*Reduce Shuttle testing by 50-60 percent.
*Increase automation by 25 percent - this year.
*Reduce the day-to-day involvement in and monitoring of contractor operations by the government.

Ironically for a space agency, NASA is old fashioned in many ways.

"NASA needs to catch up and modernize," Buckley said. "The way we work and the process by which we accomplish our work must be as modern and efficient as the rockets and launch systems we're working on."

And presently, that is not the case.

"It has always been an embarrassment to me," said Buckley, "that we're looked on as space scientists, but we're doing business in an old fashioned way by ignoring the use of the computer as a tool. Avis can locate a car anywhere in the country and determine its maintenance record," he said. And yet, the majority of KSC's quality control records are on paper.

If a quality control worker finds something wrong with a tile, for instance, he would fill out a form, itemizing the deficiency. Several people would have to read the report, approve it, sign it and pass it on.

If a part is needed, another form would have to be filled out, which would need more approving and more signing. Someone would have to look on the shelf for the part and fill out additional forms before sending the part out.

"That's one example involved a lot of people, a lot of paper and a lot of time," Buckley said.

If the system were computerized, the quality control worker could: enter the deficiency on a computer terminal without having to go back to his office, check for the part without bothering anyone at the warehouse and review a history of the tendency of similar parts to break.

"It's not a matter of proving it's practical - industry has already done it," Buckley said.

But it's not enough to computerize the paperwork. Some of the paperwork must be eliminated, especially in the area of checking out and launching a manned spaceflight.

"NASA has always been proud that we set ourselves above what's been called a bureaucratic agency," Buckley said. "But there's been some erosion of that."

"What happened is after the Apollo fire (of 1967 in which three astronauts were killed) through Congressional action, recommendations were made that laid on tremendous amounts of documentation checks and balances. And that has resulted in the tremendous bureaucratic system we have now."

Although the paperwork may be justifiable for a developmental program, much of it must be eliminated before the Shuttle system can become economical or feasible.

"When we reach these higher launch rates, the amount of data we'll be processing will far surpass the capability of doing the work on paper," he said.

"What we intend to do," Buckley said, "is examine all the requirements that exist for documentation and determine what the minimum amount of documentation is that we need for operations." The measure should not be hard to push through. "If you talk to George Page (KSC's launch director) and those guys over there (the launch team), that's one of their major objections, a lot of paperwork and a lot of signing. They've got the right frame of mind - a Can Do attitude."

But it's not just paperwork directly related to the Shuttle that needs to be eliminated or streamlined. "We need to drastically reduce the amount of paper associated with the way we're presently doing business," Buckley said.

Again, Buckley looks to the computer to accomplish this: "The center is in the process of looking for a data management system at a center level."

NASA must also let the contractors who do the work assume more responsibility, Buckley said. NASA now attempts to match the number of engineers and quality control workers contractors employ with an equal number of NASA engineers and quality control personnel.

"In the past that has proven to be a successful way to operate in the developmental stage...and we're not kicking that. After all, two sets of eyeballs are better than one.

"But for an operational system and for the sake of economics, we must streamline our check-out teams to the bare minimum," Buckley said.

In fact, in hopes that NASA and KSC can get back to the mission prescribed in its charter - research and development, the agency is considering taking a major step: turning the Shuttle over to private industry. (TODAY, 8-18-81, p. 1-A)

<> NASA at 8 AM yesterday started the nine-day Shuttle Interface Test on the mated Space Shuttle Columbia in the Vehicle Assembly Building at Kennedy Space Center. Due to the difficulties in mating the vehicle, NASA is running behind schedule for rollout of the vehicle to the launch pad, which may slip four or five days beyond the planned

August 26 date. Such a slip would likely impact the planned September 30 launch for STS-2, but such a decision has not yet been made. (DEFENSE DAILY, 8-18-81, p. 268, Vol. 117, No. 34)

<> The second Intelsat V communications satellite, launched May 23, is now in operation relaying communications between North America and Europe. The Ford Aerospace-built spacecraft will be the prime Intelsat satellite to provide communications services between the Americas, Europe, the Middle East and Africa. The first Intelsat V spacecraft, launched in December 1980, is being used as the on-orbit spare for the Atlantic network, which will eventually consist of four satellites. A total of nine Intelsat V and three Intelsat V-A satellites, all built by Ford, are planned. They will be succeeded by up to 16 Intelsat VI satellites. (DEFENSE DAILY, 8-18-81, p. 270, Vol. 117, No. 34)

**August 19:** Technicians hooked up ground-support electrical equipment and began data-processing and systems checks in a series of tests on the space shuttle Columbia that will continue through the beginning of next week.

The tests are to prepare the Columbia for its second flight into space September 30. The reusable spacecraft spent more than two days in space in an April 12 mission.

Dick Young, a spokesman at Kennedy Space Center, said officials hope the tests can be completed in time to keep an August 27 scheduled date for the shuttle's rollout to the launch pad.

Testing, which began Monday, is running about three days late because the mating of Columbia to its external fuel tank took longer than expected. The delay last week threw National Aeronautics and Space Administration technicians off their schedule.

Early next week, astronauts Joe Engle and Dick Truly will rehearse the Columbia's second flight in simulations of liftoff, orbit, re-entry into Earth's atmosphere and emergency procedures.

Work was continuing on the Columbia's thermal tiles. Workers in the Vehicle Assembly Building have 62 more tiles to add to the shuttle. (THE MIAMI HERALD, 8-19-81)

<> Some day Greyhound Bus Lines may be operating the Shuttle. Or Piedmont Airlines. Or United Space Boosters Inc. Or Rockwell International.

Chances are, it won't be NASA.

On the recommendation of three independent studies - one of them chaired by James Beggs, the man who is now the administrator of NASA - the agency is strongly considering turning over its Space Transportation System to a private contractor.

The transition will depend on how quickly the Shuttle matures as a spacecraft, but it could be made as early as 1984: "It probably will be sooner than a lot of people would like," said W. E. Backus, head of Kennedy Space Center's planning office.

Backus explained that it all got started back in 1977 in Washington headquarters: "They wondered whether NASA, being a basic R & D outfit, was in the long term solution to operate a repetitive, transportation system."

Two studies were ordered: one by the National Association of Public Administrators (chaired by Beggs) and another by the Aerospace Corp., a think tank extensively used by the Air Force. A number of alternatives were considered, including: turning the system over to the Department of Transportation; splitting NASA in two parts, a research arm and an operations leg; letting the Department of Defense run the Shuttle; and creating a quasi-commercial outfit like Amtrak (Startrak?).

Both studies ultimately came up with the same recommendation: "What they basically concluded is that for the foreseeable future...NASA should run it," Backus said. "However, they thought that the prudent thing for NASA to do is gradually make changes in the way NASA operates so the system proves to be really viable...then we would be able to make the transition to a quasi- or full- commercial operation."

Another study by the consulting firm of Booz Allen and Hamilton Inc. was ordered to find out how the transition could be made: "What they concluded was that the greatest cost saving would be...combine all the flight hardware contracts into one and all payload contracts in one," Backus said.

"In other words, one contractor to drive the truck, and one to host all the customers and care for their particular needs," he said. Kennedy Space Center decided to add a third contractor to be responsible for mowing the grass, emptying the garbage, sweeping the floors and conducting other day-to-day activities.

"What they said, in effect, is if we're going to let this thing become a viable commercial operation, we should disengage our R & D types from their traditional technical involvement," Backus said. "Right now, for instance, civil servants are involved in signing all procedures, being present during all operations, coordinating contractors, making schedule decisions...What they envisioned the civil servants would do is concentrate more on contractor performance. It would be getting out of the middle of the trees to watch the performance so you'll have a better ability to judge the contractor's performance because you're not a part of the operation."

Presently, over a dozen or more contractors are responsible for the various elements of the Shuttle system: one for the Orbiter, one for the assist rockets, one for the fuel tank, one for payloads; one for the computers; and so on. Each contractor reports to NASA separately and NASA monitors each contract on an individual basis.

Under the proposed system, the single contractor in charge of operating the Shuttle could hire the same subcontractors now doing the job. Or the main contractor could train his own people to do the job.

Backus said that as soon as people out at KSC hear about the concept, they usually ask two questions: "Will I lose my job?" and "How could the flight contractor be anyone other than Rockwell?"

Will large numbers of workers lose their jobs? "I don't know the answer to that, but historically, the answer has been no," Backus said. "In the past when contracts have changed, 80 percent of the people have kept their jobs."

Won't Rockwell International, the company now responsible for designing and developing the Orbiter and integrating the Shuttle's various parts, inherit the contract? "No, it doesn't have to be Rockwell," Backus said. "Whoever gives the best overall proposal would be the one to win it. In fact, this time the cost proposal would be a very big item, whereas when you're going through an R & D proposal, the technical excellence is a very high factor."

Backus pointed out that the Air Force, chose Martin Marietta, the company that builds the Shuttle's fuel tanks, to be the integration contractor at the West Coast Shuttle launch site at Vandenberg Air Force Base, California.

"Boeing and Lockheed build airplanes, but they don't run an airline. General Motors builds buses, but doesn't run a bus line, Electric Boat Co. builds boats but it doesn't run a ship line. "It takes a different kind of mentality. A whole different set of thinking has to go on between design and operations," he said.

Why doesn't NASA run its own Shuttle? "When you put R & D personnel into an operational system, you do two things: they keep trying to improve the technical performance as opposed to the cost performance. And you sap the agency's R & D capability." (TODAY, 8-19-81, p. 1-A)

**August 20:** The rollout of the Space Shuttle Columbia from the Vehicle Assembly Building to the launch pad at Kennedy Space Center has been rescheduled from August 26 to August 31 because equipment testing aboard the Shuttle is behind schedule.

The delay is expected to impact the planned September 30 launch of the Shuttle, but no decision on a rescheduling has been made as yet.

At Kennedy Space Center, a NASA spokesman said there were "no big problems" with the Shuttle, "just a lot of little ones." He said that testing is taking longer than expected as is putting test programs in computers aboard the Columbia. Mating of the Orbiter to its External Tank also went over schedule.

NASA is currently running the Shuttle Interface Test on Columbia, which is scheduled to conclude early next week with the flight astronauts conducting simulated takeoff, orbital maneuvers, descent and landing. (DEFENSE DAILY, 8-20-81, p. 283, Vol. 117, No. 36)

**August 21:** The NASA manager responsible for recommending to the NASA administrator what course the agency should take toward developing a space station is currently continuing to evaluate two basic space station concept options and does not expect to reach a final decision on what station concept to recommend for construction until 1983 or possibly 1984 after further contractor studies.

In an interview with DEFENSE DAILY, Ivan Bekey, chief of advanced concepts in the Advanced Programs Directorate of NASA-Headquarters Office of Space Transportation Systems, said the two major concepts that are being evaluated are:

1) The Space Operations Center (SOC) concept developed by Johnson Space Center and evaluated in a recently completed Phase A study by Boeing Co., with Rockwell International looking at integration of the SOC with the Space Shuttle; and,

2) A "Growth" Science and Applications Space Platform concept developed by Marshall Space Flight Center and currently in pre-Phase A study by McDonnell Douglas.

(DEFENSE DAILY, 8-21-81, p. 287, Vol. 117, No. 37)

<> Kennedy Space Center has awarded Martin Marietta a $3.48 million revision contract for accelerating work on the Space Shuttle External Tank. (DEFENSE DAILY, 8-21-81, p. 292, Vol. 117, No. 37)

**August 22:** University of South Florida professor Bill Fisher was among 21 men and women selected Friday as Space Shuttle astronauts.

Fisher, whose wife Anna was selected as a Shuttle astronaut in 1979, is one of five physicians qualified to travel in space.

A resident of Houston, the 35-year-old Fisher, is a specialist in emergency medicine with particular interest in healing properties in space and the effect of weightlessness on the inner ear.

A member of the 70-member U.S. astronaut corps, Fisher was selected as a candidate in 1980 and began training in July of that year.

Fisher is not expected to fly in the Shuttle until after 1983.

Fisher and his wife made Brevard headlines in December 1980 when they were credited with attempting to save the life of a Cocoa Beach man involved in a motorcycle accident.

The Fishers spotted the man lying lifeless on SR 528. They revived him but he died more than a week later.

Another native Floridian included in Friday's announced crop of Shuttle astronauts is Richard Richards of Key West.

NASA also selected two European scientists, one from Switzerland, the other from Holland, for the astronaut training program because of the European Space Agency's funding and development of Spacelab.

One will continue to train as a payload specialist at Marshall Space Flight Center, in Huntsville, Alabama, and the other will be assigned to Johnson Space Center in Houston. (TODAY, 8-22-81)

<> Voyager 2, racing to a Tuesday night rendezvous with Saturn, already is taking "snappier-looking pictures" of the pastel features swirling in the planet's butterscotch clouds, scientists said Friday.

And as the spaceship sails, to just 63,000 miles above the cloud tops - the closest thing to a surface on the gaseous planet - it promises still more surprises and perhaps a few answers to the riddles found during Voyager 1's flight past the planet last November.

"We expect to get an even better look at Saturn this time," project scientist Edward C. Stone said at a news conference. (TODAY, 8-22-81)

**August 24:** October 2 was set last week as the launch date for the second space shuttle mission as National Aeronautics and Space Administration continued to experience delays in accomplishing integrated tests of the shuttle system.

"Overall, system testing is going very well, but we are plagued by human errors," according to A.D. O'Hara, director of space transportation system processing. "We are trying to determine why there are errors - if people are tired, or if there is a lack of discipline to existing systems."

The October 2 date represents a two-day delay from a schedule set May 18, and although NASA is establishing a space shuttle turnaround schedule, O'Hara said: "We are not happy as managers. We laid out a schedule and work is taking longer than we forecast."

Rollout of the shuttle system to Launch Complex 39A now is scheduled for August 31. Meeting this date depends on simulated mission runs by prime and backup astronaut crews scheduled to begin at 10 a.m., August 24. The crews are to simulate a primary ascent, primary descent and backup return to launch site abort.

Problems causing delays last week involved two faulty umbilical connections between the ground and the orbiter. A helium leak developed at a metal-to-metal seal that used ground bolts. When flight bolts were installed, the leak stopped.

It took longer than expected to install ordnance because of the scheduling problem with the small, specialized crew that does this work, O'Hara said.

A group consisting of Kennedy and Johnson Space Center representatives and representatives of Rockwell International, the prime shuttle orbiter contractor, is analyzing potential design changes - such as the helium umbilical connection seals - that could ease the launch preparation operation.

Although many more tiles were removed after the first shuttle flight than expected, the thermal protection system tile work for the coming flight "is a dream" compared to the work that proceded the first launch, O'Hara said.

Mobile launch platform modifications are under way concurrently with shuttle interface tests in the Vehicle Assembly Building here. The modifications are designed to deflect a high-pressure pulse from solid rocket booster ignition away from the orbiter. Although considerable cutting and welding is required, there have been no interference problems between the launch platform and shuttle stack, O'Hara said.

Primary differences in launch preparations between the first and second shuttle flights are the addition of an integrated test with Johnson Space Center and with the Office of Space and Terrestrial Applications (OSTA) payload, addition of an integrated cyogenic loading and auxiliary power unit recertification, deletion of the flight readiness firing and use of a restructured launch countdown with fewer built-in holds. (AVIATION WEEK & SPACE TECHNOLOGY, 8-24-81, p. 21, Vol. 115, No. 8)

<> (letter to the editor of Today) I keep reading references to the upcoming Space Shuttle's STS-2 mission as "the first flight of a 'used' spacecraft." Technically, this is not true.

Gemini spacecraft number 2 was launched from Complex 19 on January 19,1965, on the unmanned GT-2 mission. The spacecraft reached an altitude of about 106 miles, and traveled approximately 2,122 miles downrange during its 18-minute suborbital flight. During re-entry, the spacecraft was subjected to the most severe heating of any Gemini mission. A successful recovery was made by the aircraft carrier USS Lake Champlain.

The spacecraft was returned to the McDonnell Aircraft Corporation where it was refurbished and modified to the Gemini B configuration for use in the Air Force Manned Orbiting Laboratory program. The main visible external change was a small circle cut into the heat shield to simulate a hatch to be used by Air Force astronauts in entering and leaving the Manned Orbiting Laboratory.

Gemini B was launched from Complex 41 aboard a Titan III-C on November 3, 1966, as part of the OV43 payload. The flight was a "roller coaster" trajectory, reaching about 123 miles in altitude before the vehicle was pitched down and the transtage engine ignited (increasing velocity.)

For years, this first American spacecraft to have flown twice in space has been on display in the exhibit hall of the Air Force Space Museum on the Cape. It is still there.

True, the upcoming STS-2 mission will be the first manned flight aboard a "used" spacecraft, but let's give credit where credit is due. (TODAY, 8-24-81, p. 8-A)

<> Just 15 months ago, the wind whistled through the rusty orange grid-work of Cape Canaveral's abandoned Complex 13 as Air Force officials debated what to do with its deteriorating hulk.

Its towering gantry, once the focal point of a nation on its way to the moon, was valued only by the pound - as scrap.

Now Complex 13 and a few other surviving launch sites at Cape Canaveral Air Force Station are on their way to becoming historic monuments.

First ignored and then dynamited as hazards, the imposing towers that pointed America toward the moon and stars fell one by one during the 1970s, when America's interest was turned toward Southeast Asia and problems closer to home.

Of 34 launch pads at the Cape, only nine are still in use. Of those not in use, only three remain intact.

Gone is Complex 19, where 20 men were placed into orbit as part of the Gemini program.

Gone is Complex 14, the pad that was the starting place of John Glenn's ride into orbit.

Gone are Complexes 34 and 37, where 15 Saturn rockets were launched and where three astronauts gave their lives in an effort to put man on the moon.

But now there is growing hope for the remaining launch towers and for other valuable Indian and pioneer sites at Cape Canaveral.

"I have a pretty good feeling about it," said Major Jerome Ashman, commander of Cape Canaveral Air Force Station. "I think that within the constraints of the budget we're going to do everything we can to preserve these sites."

Two separate efforts are under way to save historical sites at the Cape - one ordered by Congress and one requested by the Air Force. (TODAY, 8-24-81)

**August 25:** Astronauts Joe Engle and Dick Truly guided the space shuttle Columbia through a mock launch Monday evening, eight hours after a balky computer forced a delay in a series of rehearsals for the craft's second voyage.

The Columbia made its make-believe liftoff at 6 p.m. Officials at Kennedy Space Center said the simulation - scheduled for 10 a.m. - was delayed by problems in the special computer program for the rehearsals.

The program, which would not be used during a real mission, "fools" the spaceship into thinking it is flying, they said. The computer shut down four seconds before the simulated liftoff in the first attempt.

Engle, Truly and backup astronauts Thomas Mattingly and Henry Hartsfield will put the craft through simulated liftoff, launch and re-entry problems as the tests continue through today.

The shuttle isn't fueled and the vehicle is still in the Vehicle Assembly Building, lashed nose-up to its towering fuel tank and solid-fuel boosters. The astronauts rest on their backs in the ejection seats as they go through the test maneuvers.

The Columbia is scheduled to be rolled out of the VAB to its launch pad on August 31.

Launch is still set for September 30. (SENTINEL STAR, 8-25-81)

**August 27:** The Space Shuttle passed the last in a battery of tests with straight A's Wednesday and was declared ready for its move to the launch pad Monday. But NASA officials in Washington, D. C., said they doubt the spacecraft will be launched on schedule.

"It (September 30 launch) is a very remote possibility," said Dave Garrett, a NASA spokesman in Washington. "At this point it looks more like the first week of October. That could be anywhere from October 2 to October 9."

The delay would be blamed on the slower than expected work in mating the Orbiter Columbia with its solid rocket boosters and fuel tank earlier this month.

The Shuttle's nine-day integrated tests, which ended early Wednesday morning, were successful overall, said A. D. O'Hara, director of space transportation system processing at Kennedy Space Center.

O'Hara said the tests conducted inside the garage-like Vehicle Assembly Building, showed a "maturing of the Shuttle hardware and test teams" as compared to similar tests before the first Shuttle launch.

"The guys in the firing room reacted well. We were very pleased," O'Hara said.

During tests Monday through Wednesday, Shuttle astronauts and the back-up crew operated the Columbia's controls while computers put the Shuttle through simulated launch ascent and landing.

Wednesday's one-hour test involved the Shuttle backup crew of Ken Mattingly and Henry Hartsfield in a smooth mock re-entry into the Earth's atmosphere and a landing.

The Columbia also received high marks earlier this week after primary astronauts Joe Engle and Richard Truly guided the Shuttle through a make-believe launch, which was delayed eight hours by a faulty computer program.

Before the Shuttle is moved to launch Complex 39A, it must be disconnected from the skeleton of work stands that girdle the 184-foot vehicle, said KSC spokesman High Harris.

After that, one of NASA's super transporter-crawlers is positioned under the mobile launch pad. The entire 4 million-pound unit is carried at about one mile an hour to the pad.

The Shuttle's rollout to the pad should take about five hours, Harris said. (TODAY, 8-27-81, p. 1-A)

<> When the Space Shuttle Columbia circles the globe, a cloud of dust and debris travels with it "like a dirty little atmosphere," a University of Florida space expert says.

And the Shuttle's first scientific payload will include an instrument to study the mess.

"Everything that orbits around the Earth has a little cloud of dust and dirt and flakes of paint that orbits around with it," said Jerry Weinberg of UF's Space Astronomy Laboratory. "The sun shines on it and creates a glow. It's hard to look through it."

An instrument that will examine the debris will move to Kennedy Space Center soon to await its scheduled January 1982 ride, the third scheduled voyage of the reusable spacecraft.

"We're spending lots of money to observe the universe from a space platform. This instrument will see how the surrounding contamination cloud - it's like a dirty little atmosphere, really - affects the light that comes in different parts of the spectrum," Weinberg said.

The device will help determine where the dust comes from so the Shuttle may be able to clean up its unwanted companion, said Weinberg, who devised such an instrument.

Space scientists are careful to keep dust to a minimum: the Shuttle is housed in a dust-quarantined laboratory, and visitors first go through sophisticated vacuum cleaners.

"But still, when the Shuttle's bay doors were opened, a bolt and other debris floated out," Weinberg said.

Weinberg, who has been studying space dust for 21 years, also will study the astronomical glow of dust throughout the solar system. (TODAY, 8-27-81)

<> Hundreds of space workers who normally enter Kennedy Space Center from SR 402 were forced to make a detour Wednesday morning when the drawbridge linking the space center and Titusville malfunctioned.

County Road and Bridge Director Macon Ballard said one of four electrically controlled mechanical wedges, which normally lock the bridge in the closed position, was somehow knocked out of alignment when the bridgetender attempted to close the swing span at 6 a.m.

"It was just a matter of realigning the wedge and doing some welding. It was a minor repair but time consuming," Ballard said.

The bridge, which spans the Indian River, was reopened to vehicle and boat traffic about 11 a.m. Wednesday. (TODAY, 8-27-81)

**August 29:** The second mission of the Space Shuttle Columbia has been pushed back to October 9 if launch preparations continue without problems, NASA announced late Friday afternoon.

The decision to postpone the September 30 launch came as no surprise to Shuttle engineers who were put five days behind schedule because of problems preparing the spacecraft inside the Vehicle Assembly Building.

The biggest setback came during the mating of the Orbiter with its massive external fuel tank and two rocket boosters two weeks ago, said Kennedy Space Center spokesman Dick Young. (TODAY, 8-29-81, p. 1-A)

<> The launch of a business communications satellite from Cape Canaveral Air Force Station on September 3 has been delayed indefinitely because of engine problems, said a spokesman for Satellite Business Systems Incorporated Friday evening.

Spokesman Bill Dunne said the launch of SBS-2 had been put back "for what could be weeks and maybe months" because of problems with a solid-fuel motor in the so-called Payload Assist Module, or PAM.

"There was a bad engine firing last night," said Dick Young, Kennedy Space Center spokesman.

A meeting is set Monday between representatives of SBS and NASA officials working with expendable launch vehicles to discuss the satellite's problems.

The PAM motor amounts to the third stage of the rocket vehicle and thus is essential since its boost provides the final thrust needed to put the satellite in orbit. The motor on the SBS payload assist module is known as a STAR-48 and was built by Thiokol Corporation.

The satellite is to be launched aboard a two-stage Delta rocket. (TODAY, 8-29-81)

<> The school science fair was never like this.

High school students today can take their experiments anywhere - even 170 miles up, thanks to a small locker aboard the Space Shuttle.

Meeting at Kennedy Space Center Friday, high school students from around the country told NASA scientists and the public what they would like to subject to a zero gravity environment.

That includes everything from flying insects to tiny sponges to rats with arthritis.

The young men and women are a select group chosen from a field of 1,500 entries in the first Shuttle Student Involvement Project, a joint venture of NASA and the National Science Teachers Association.

But Friday's presentation wasn't all academic. There was talk of money - without it a number of student Shuttle experiments that get off the ground will be severely limited.

"Anything designed to go up in space is expensive. There are design reviews, safety checks," said Dr. Glen Wilson, NASA acting director of academic affairs.

He estimated some of the experiments can cost as much as $4,000 to $6,000 and more - a burden even to the corporate sponsors that bankroll the student experiments.

One of those more expensive experiments belongs to the only Florida winner, Aaron Gillette of Winter Haven.

The Winter Haven Senior High School 12th-grader plans to send tiny sponges, or sporifera, into orbit and induce them to break apart into individual cells, as they do in nature.

Why take pictures of tiny sponges breaking apart and coming together again?

Looking ahead to the 21st century when orbiting space stations may be a new place to do business, Gillette would like to know more about the healing process in space and even the production of artificial limbs above the earth.

Neither Gillette nor Wilson have any idea when the sponges will accompany Shuttle astronauts in space.

"It's unlikely for this Shuttle mission. Some of the more complex experiments will take two to three years to prepare," Wilson said. (TODAY, 8-29-81)

**August 31:** The space shuttle Columbia was scheduled to be rolled out of the huge Vehicle Assembly Building before dawn today for the snail's-paced first leg of its next journey to outer space.

The shuttle, attached to its two solid-fuel booster rockets and huge external fuel tank, will be moved 3 1/2 miles across the Kennedy Space Center to its ocean-side launch pad, where it will be readied for its second launch October 9.

The trip to the pad at 1 mph with frequent stops, is expected to take seven hours. It is scheduled to begin at 5 a.m. so the shuttle can reach the launch pad at 1 p.m. before expected afternoon thunderstorms begin. (SENTINEL STAR, 8-31-81, p. 2-C)

<> More than 200 employees of Kennedy Space Center were honored with awards for their contributions and service to the Space Shuttle program on Monday, August 31. Group achievement awards were presented to 39 organizations that played outstanding roles in making the first Space Shuttle mission a success.

Presenting the awards were NASA Administrator James M. Beggs; L. Michael Weeks, Acting Associate Administrator for Space Transportation Systems, and KSC Director Richard G. Smith.

The awards ceremony was held in a large tent near the Barge Basin at Complex 39 and its date coincided with the rollout of the Space Shuttle for the second mission from the Vehicle Assembly Building to the launch pad. Visible in the background was the Space Shuttle vehicle being transported to the pad at snail's-pace speed of about one mile per hour.

The NASA Distinguished Service Medal, one of the highest agency awards that can be earned by an individual, was presented to six persons. It is granted for distinguished service, ability or courage in making a contribution representing substantial progress to aeronautics or space exploration.

Recipients of the DSM were: Raymond L. Clark, Robert H. Gray, Peter A. Minderman, George F. Page, Richard G. Smith and Thomas E. Utsman.

The NASA Distinguished Public Service Medal, for meritorious contributions, was awarded to six contractor employees. They were: Paul C. Donnelly of United Space Boosters, Inc.; Howard S. Hardcastle of Boeing Services International, Inc.; Thomas J. O'Malley of Rockwell International Corporation; Dr. Thomas Williams of Computer Sciences Corporation; Thomas C. Wirth of Martin Marietta Aerospace; and Eugene C. Wood of Martin Marietta Corporation.

The NASA Outstanding Leadership Medal, for notably outstanding leadership was awarded to 11 employees including: John T. Conway, Col. Marvin L. Jones (USAF), William H. Lohse, John R. Lyon, Joseph F. Malaga, Alfred D. O'Hara, Henry C. Paul, Andrew J. Pickett, Thomas S. Walton, Wiley E. Williams, and George T. Sasseen.

The ten employees honored with the NASA Exceptional Engineering Achievement Medal were: Satish Amand, William W. Bailey, Ronald L. Bartcher, Donald D. Buchanan, Frank Byrne, Kenneth R. Clark, Terry D. Greenfield, Robert B. Martin, James D. Phillips, and Orval Sparkman.

The NASA Exceptional Service Medal, signifying achievement or service characterized by unusual initiative or creative ability, was awarded to 80 employees. The NASA Public Service Medal, awarded for exceptional contributions to engineering, design and development or management coordination of programs related to the accomplishment of the mission of NASA, was presented to 30 contractor employees. The NASA Certificate of Appreciation, for service or contribution to the center which warrants local recognition, was presented to 85 outstanding space center workers.

The NASA Group Achievement Award, for outstanding teamwork or group effort, was presented to 17 organizations for their contibutions to the launch of the Space Shuttle. Some of the organizations are: the KSC Launch Operations Support Team, the Eastern Space and Missile Center at Patrick Air Force Base; Detachment 11, Second Weather Squadron, Patrick Air Force Base; the KSC Executive Management STS-1 Support Staff; the Shuttle Center Support Team; the Public Affairs Office; The Sensor Development Team, Director of Design Engineering; the Engineering Documentation Team, Director of Design Engineering; the Microwave Scanning Beam Ground System Team; the Launch Processing System Engineering Management Team, Director of Design Engineering; and the Department of Defense Manager's Space Shuttle Support Office.

Also included were: the San Antonio Air Logistics Center, Directorate of Energy Management Material Division; the 2179th Communications Group; the General Services Administration Interagency Motor Pool; the Solid Rocket Booster Retrieval Team; the Federal Aviation Administration STS-1 Launch Support Team; and the Reliability and Safety Analyses Team, Director of Design Engineering.

The NASA Public Service Group Achievement Award, for outstanding teamwork or group achievement, was presented to 22 contractors, including: Rockwell International Corporation for the Launch Operations Group; Martin Marietta Aerospace for the External Tank Operations Project; United Space Boosters, Inc.; Thiokol Corporation; Catalytic, Inc.; McGregor & Werner, Inc.; RCA Services Company for the Communications and Instrumentation Support Services Project Team; Planning Research Corporation for the Design Management Team; and Boeing Services International, Inc. for both the Ground Systems Operations Team and the Supply and Transportation Services Team.

Other contractors honored were: Technicolor Graphic Services, Inc.; the Bionetics Corporation for Standards and Calibration Support Services Team; Pan American for Occupational Medicine and Environmental Health Services Team; both RCA Services Company and Pan American for Space Shuttle Support; Honeywell Information Systems, Inc. for Launch Processing System Central Data Subsystem Project Team; and Management Services, Inc. for Component Refurbishment and Chemical Analysis Team.

Additional contractors honored were: Wackenhut Services, Inc.; Expedient Services, Inc.; Unified Service, Inc.; Canteen of Florida, Inc.; Atlantic Technical Services, Inc.; and RCA Communications. These last six recipients ar. involved in center support operations. (KSC NEWS RE..ASE No. 218-81, 8-31-81)